UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

MARCH, 1889.

CONTENTS.

PREPARED UNDER THE DIRECTION OF
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SIGNAL OFFICE.
1889.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of March, 1889.

Name of vessel.	Captain.
Am. s. s. Adirondack	J. Sansom.
Br. Adriatic	J. G. Cameron.
Advance	D. E. Griffiths.
Aguan	J. C. Adair.
Ailsa	J. W. Morris.
Am. Alamo	Samuel Risk.
Br. Alaska	G. S. Murray.
Albany	H. A. Gough.
Alene	E. J. Seiders.
Alexandria	W. Laird.
Ger. Allemannia	Droescher.
Aller	H. Christoffers.
Br. Almandine	C. S. Collings.
Alvena	F. McKay.
Alvo	D. Williams.
Ger. America	R. Heintze.
Dtch. Amsterdam	A. Potjer.
Br. Andean	H. Wraxe.
Arabic	W. M. Smith
Ardanrigh	W. Anderson.
Arizona	S. Brooks.
Athos	H. Low.
Aurania	W. H. P. Hains.
Australia	J. McKeague.
Nor. Balder	L. Christie.
Ger. Baltimore	G. Thumann.
Br. Barracouta	R. R. Hubbard.
Barrowmore	J. Inch.
Ger. Baumwall	C. H. Rehse.
Br. Bavarian	M. Fitt.
Belg. Belgenland	C. H. Grant.
Br. Bellona	A. Blacklock.
Bengore Head	J. R. Brady.
Borderer	F. Manley.
Bracadaile	J. Notman.
Ger. Braunschweig	H. Bodeker.
Br. Britannic	H. Parsell.
British King	John Kelly.
British Prince	S. Nowell.
British Princess	E. H. Freeth.
Fr. Brittania	J. Parazols.
Br. Brooklyn City	W. Fitt.
Buffalo	J. H. Malet.
Bulgarian	R. Leask.
Fr. Burgundia	F. Dulac.
Ger. California	H. Bauer.
Br. Camellia	E. Penney.
Canada	J. Robinson.
Caribbean	H. Daniel.
Carroll	G. H. Brown.
Carthaginian	A. McNicol.
Caspian	A. McDougall.
Catalonia	J. J. Atkin.
Span. Cataluna	F. Jaureguiar.
Ger. Catania	H. M. Franck.
Br. Celtic	H. Davison.
Cephalonia	W. S. Seccombe.
Am. Chalmette	G. W. Mason.
Fr. Chateau Lafite	M. C. Ollivier.
Br. Chancellor	W. Lymas.
Am. Cherokee	B. F. Doane.
Br. Circassia	Harris.
Circe	A. T. Crighton.
Am. City of Alexandria	J. McIntosh.
City of Augusta	J. W. Catherine.
Br. City of Berlin	F. M. Passow.
Am. City of Chester	R. Bond.
Br. City of Chicago	A. Redford.
City of Manchester	H. Brophy.
Am. City of Para	J. L. Lockwood.
City of Washington	J. W. Reynolds.
Br. Colina	R. C. Jennings.
Colon	F. Henderson.
Am. Colorado	F. E. Jenkins.
Br. Cuban	D. Lawson.
Cydonia	E. S. Winspeare.
Dalton	J. Russell.
Denmark	R. S. Rigby.
Devonia	J. Craig.
Earnwell	C. N. Mumford.
Egyptian Monarch	W. S. Morgan.
Ger. Elbe	R. Sander.
Am. El Paso	H. S. Quick.
Ger. Ems	T. Jungst.
Br. Engineer	G. Jeffrey.
England	A. F. Heeley.
It. Entella	V. Bruno.
Br. Erin	W. Tyson.
Ethelbald	Chas. Smith.
Ethiopia	J. Wilson.
Etruria	H. Walker.
Euphrates	J. Edwards.
Exeter City	T. L. Weise.
Am. Excelsior	H. L. Higgins.
Br. Falsham	C. Bennett.
Federation	R. Pinkham.
Span. Federico	L. de Luzarragi.
Br. Floridian	S. S. Sandrey.
France	A. D. Hadley.
Ger. Francia	P. Tilly.
Fulda	R. Ringk.
Span. Gaditano	F. Goicoechea.
Br. Galileo	W. Magee.
Gallia	M. Murphy.
Ger. Gellert	G. Schmidt.
Br. Germanic	P. J. Irving.
Gilsland	M. L. Robinson.
Glenogle	W. E. Duke.
Glenorchy	I. Ferguson.
Ger. Gluckauf	V. Szymanski.
Br. Godrevy	J. C. Brown.
Gothenburg City	J. Harrison.
Ger. Gothia	A. Kuhn.

Name of vessel.	Captain.
Br. s. s. Governor	J. Valiant.
Greece	A. J. Jeffrey.
Span. Guido	E. Lachiondo
Am. Guyandotte	R. B. Boaz.
Br. Haytien	J. Coward.
Dan. Hekla	A. G. Thomsen.
Br. Helvetia	G. Cochrane.
Ger. Hermann	A. Kohlmann.
Br. Holland	T. Foote.
Ger. Hohenzollern	A. Meier.
Am. Hudson	H. R. Freeman.
Indiana	W. J. Boggs.
It. Iniziativa	A. Conzoneri.
Br. Iowa	E. W. Owens.
Dan. Island	W. Skjodt.
Br. Istrian	A. W. Ball.
Italy	W. Pearce.
Ixia	W. Churnside.
Jamaican	D. Edwards.
Joshua Nicholson	C. H. Regnart.
Kansas	W. Gleig.
King's Cross	G. J. Mills.
Am. Knickerbocker	F. Kemble.
Fr. La Bourgogne	E. Franguel.
La Bretagne	M. de Jousselin.
La Champagne	Boyer.
La Gascogne	Santelli.
Ger. Lahn	H. Hellmers.
Br. Lake Huron	M. L. Tranmar.
Lake Ontario	H. Campbell.
Lake Superior	W. Stewart.
Lake Winnipeg	P. D. Murray.
Am. Lampassas	M. B. Crowell.
Dtch. Leerdam	G. Stenger.
Ger. Leipzig	D. Rohlenbeck.
Br. Lero	J. Chisholm.
It. Letimbro	M. di Marco.
Br. Llandaff City	T. H. Gore.
Lord Clive	P. Urquhart.
Lord Gough	E. M. Hughes.
Lord O'Neill	A. Ferris.
Am. Lorenzo D. Baker	W. F. Wiley.
Louisiana	E. V. Gager.
Ger. Main	M. Moller.
Br. Maine	R. Griffiths.
Am. Manhattan	F. Stevens.
Br. Manitoban	W. Dunlop.
Marsca	L. O. Moen.
Ger. Marsala	N. Maass.
Br. Martello	W. Abbott.
Maryland	A. H. Luckhurst.
Mentmore	R. Waite.
Michigan	H. Bocquet.
Michigan	S. Walters.
Mineola	T. L. Evans.
Minia	S. Trott.
Montreal	J. Wall.
Ger. Moravia	Winkler.
Br. Muriel	G. S. Locke.
Naranja	J. Scully.
Belg. Nederland	A. R. Mills.
Br. Nessmore	G. Elliott.
Nevada	Cushing.
Am. Newport	C. C. Lima.
Belg. Noordland	H. E. Nickels.
Br. Norseman	R. Williams.
Am. Nueces	J. Bolger.
Br. Ohio	R. W. Sargent.
Ontario	W. P. Couch.
Oranmore	B. Jones.
Oregon	H. C. Williams.
Orinoco	J. S. Garvin.
Otranto	W. Rippeth.
Palestine	W. Whiteway.
Pavonia	A. McKay.
Dtch. P. Caland	G. Lutz.
Belg. Pennland	Rud. Weyer.
Am. Pennsylvania	E. B. Thomas.
Br. Picqua	W. H. Brown.
Ponca	W. Bowen.
Pontiac	R. Blythe.
Ger. Preussen	C. Pohle.
Br. Procida	J. Fendt.
Reading	J. S. Grey.
Restormel	John Richards.
Ger. Rhaetia	H. Vogelgesang.
Belg. Rhynland	A. J. Griffin.
Br. Richmond Hill	H. H. Perry.
Ripon City	J. Brotchie.
Robina	T. H. Smith.
Roman	E. Maddox.
Rosarian	D. M. Killop.
Dtch. Rotterdam	H. C. v. d. Zee.
Ger. Rugia	R. Karlowa.
Saale	H. Richter.
Br. Saint Ronans	H. Campbell.
Samaria	J. B. Watt.
Santiago	J. B. Allen.
Sarnia	J. Gibson.
Scandinavian	J. Park.
Servia	H. McKay.
Siberian	R. P. Moore.
Spain	W. A. Griffiths.
State of Georgia	G. Moodie.
State of Indiana	A. Ritchie.
State of Nevada	J. A. Stewart.
State of Pennsylvania	A. J. A. Mann.
State of Texas	G. Williams.
Stockholm City	W. Thompson.
Straits of Gibraltar	G. Grigs.
Belg. Switzerland	J. Ueberweg.
Br. Thanemore	C. W. Simpson.
The Queen	G. T. Gondie.

Name of vessel.	Captain.
Dan. Thingvalla	Larsen.
Br. s. s. Toronto	J. MacAuley.
Tower Hill	R. Bennett.
Ger. Trave	W. Willigerod.
Br. Trinacria	G. Mitchell.
Trinidad	W. J. Fraser.
Hay. Tropic	J. Barber.
Br. Ulanda	F. Clark.
Umbria	W. McMickan.
Vancouver	C. J. Lindall.
Dtch. Veendam	F. H. Bonjer.
Br. Venetian	E. Parry.
Br. Viola	L. Murray.
Virginian	W. C. Fry.
Belg. Waesland	H. Buschmann.
Ger. Werra	R. Bussius.
Weser	W. v. Schuckmann.
Belg. Westernland	J. C. Jamison.
Br. Wetherby	S. Harrison.
Ger. Wieland	H. Barends.
Br. William Cliff	E. Winder.
Wisconsin	J. P. Worral.
Wylo	T. Rogers.
Wyoming	C. L. Rigby.
Dtch. Zaandam	W. Ponson.
Belg. Zeeland	E. Bence.
United States Naval.	
U. S. C. S. Blake	J. E. Pillsbury.
U. S. S. Constellation	C. T. Train.
U. S. R. S. Dale	Yates Stirling.
U. S. S. Despatch	W. S. Cowles.
U. S. R. S. Franklin	B. S. Richards.
U. S. R. S. Independence	J. W. Philip.
U. S. S. Kearsarge	A. D. Brown.
U. S. S. Lancaster	T. F. Kane.
U. S. S. Michigan	H. F. Picking.
U. S. S. Minnesota	G. C. Wiltse.
U. S. S. Mohican	J. B. Coughlan.
U. S. S. New Hampshire	J. F. Higginson.
U. S. S. Ranger	F. A. Cook.
U. S. S. Wabash	C. C. Carpenter.
New York Herald reports.	
Am. s. s. Algiers	J. B. Percy.
Br. Anchoria	A. Campbell.
City of New York	A. W. Lewis.
Croma	W. R. Lord.
Dorian	J. MacFarlane.
Br. Egypt	J. Sumner.
Am. El Monte	J. W. Hawthorne.
New Orleans	T. P. C. Halsey.
Sailing vessels.	
Br. sp. Accrington	H. W. Dyke.
Am. bk. Albemarle	W. H. Forbes.
Alice	W. G. Kair.
schr. Alice Archer	R. E. Fletcher.
bkt. Bonny Doon	Chas. Burgess.
Ger. sp. Charles Luling	C. Wiehe.
Am. schr. City of Baltimore	L. S. Tawes.
bk. Clotilde	I. W. Bowden.
Crescent	J. W. Bartlett.
pilot E. C. Knight	J. F. Springer.
bg. Edith	W. G. Foster.
schr. Ellen M. Golder	R. J. Johnstone.
Emma C. Knowles	A. W. Mayhew.
Br. bkt. Eva Lynch	Jas. Sutherland.
bg. George	Arthur Edgett.
Am. sp. Gov. Goodwin	S. Pray.
Nor. bk. Hanna	S. Falch Muns.
Am. bkt. Harriet S. Jackson	W. Bacon.
Br. bgt. Hattie Louise	W. H. Barnard.
Am. bk. Havana	B. F. Rice.
bg. H. B. Hussey	G. W. Hodgdon.
schr. Henry A. Faber	C. J. Slocum.
bkt. Henry Warner	J. T. Paine.
Br. bk. Herbert C. Hall	G. H. Perry.
Iodine	Adam Smith.
Am. yacht Iroquois	F. F. Norton.
Nor. bk. Johan Irgens	I. Iversen.
Am. schr. John R. Bergen	W. H. Squires.
bk. John R. Stanhope	J. B. Norton.
bkt. Josephine	C. Brown.
pilot Joseph F. Loubat	J. McCarthy.
Br. sp. Kelat	J. McKay.
Am. bg. L. F. Munson	J. V. McKowen.
Light vessel No. 45	Andrew Jackson.
Br. sp. Lord Raglan	W. Campbell.
Am. Louis Walsh	T. C. Pendleton.
schr. Lucis Porter	J. F. Grindel.
bk. Mary Fink	D. B. Darrah.
schr. Mary Hubbard	J. N. Hubbard.
Maud H. Dudley	D. W. Oliver.
bkt. Matthew Baird	J. P. Williams.
schr. Messenger	N. H. Falker.
bkt. Monsita	F. M. Wallace.
tern. Nantasket	E. A. Richardson.
Ger. bk. Nanny	B. H. Huller.
Am. schr. Navarino	J. W. Cole.
bk. Neptune	J. F. Hill.
Nor. Orion	A. Matheison.
Am. schr. Phebe	M. Medero.
Ger. bk. Pillau	G. Gerlach.
Nor. Ran	N. A. Maroni.
sp. Rolf	T. S. Torgensen.
Br. bk. Salina	J. Peterson.
Sapphire	G. W. Murray.
Am. Sarah	L. R. Hale.
schr. Sebago	G. M. Locke.
Thomas P. Ball	J. A. Johnson.
bk. Tremont	Brophy.
Br. bk. Valona	H. Andrews.
Am. bgt. Willie	B. J. McHaffey.
schr. Wm. F. Green	W. E. Crockett.
Winnie Lowry	A. McRitchie.

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVII. WASHINGTON CITY, MARCH, 1889. No. 3.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for March, 1889, and is based upon reports of regular and voluntary observers of both countries.

On chart i the paths of the centres of nine areas of low pressure are shown; the average number traced for March during the last fifteen years being 11.7. This chart also exhibits the approximate paths of the centres of twelve depressions traced over the north Atlantic Ocean; the limits of fog-belts west of the fortieth meridian, and the distribution of field ice during the month. Unusually severe weather prevailed over the western part of the north Atlantic, and there was a remarkable deficiency of Arctic ice, this being the first March in the last eight years for which large quantities of icebergs and field ice were not reported over and near the Banks of Newfoundland. The areas of high and low pressure and north Atlantic storms are discussed under their respective headings.

Chart ii exhibits the distribution of mean atmospheric pressure and temperature for the month. The mean temperature was generally above the normal, except in districts lying south of the thirty-fifth parallel and east of the one hundred and twelfth meridian. The greatest departures above the normal occurred in the north-central part of the country, where, at stations, they exceeded 15°. The departures below the normal were less than 5°, except in the lower Rio Grande valley. At a number of stations distributed from the Atlantic to the Pacific oceans the highest absolute temperature noted during the periods of observation was reported.

The distribution of precipitation for March, 1889, is shown on chart iii, and the normal precipitation for eighteen years is exhibited on chart iv. A notable feature of the precipitation of the month was the heavy rainfall on the middle and southern Pacific coast, where more than double the usual amount of rainfall for March fell. In Florida the precipitation exceeded the normal by nearly one hundred per cent. The greatest deficiency occurred in the upper lake region, where forty per cent. of the normal fell, and in the Ohio Valley, Tennessee, the extreme Northwest, and upper Mississippi valley, where about one-half the usual amount was reported.

Chart v exhibits the depth of snow on the ground at the close of the month, and the limits of freezing weather during March, 1889.

Commencing with July, 1888, the meteorological means for the regular stations of the Signal Service have been determined from observations taken twice daily at 8 a. m. and 8 p. m. (75th meridian time). These hours of observation have been permanently adopted to supersede the former system of tri-daily observations taken at eight-hour intervals. The monthly mean temperature for Signal Service stations represents the mean of the maximum and minimum temperatures.

In the preparation of this REVIEW data from 1,969 stations have been used, classified as follows: 175 Signal Service stations; 108 monthly registers from United States Army post surgeons; 1,182 monthly registers from state weather service and voluntary observers; 23 Canadian stations; 165 stations, through the Central Pacific Railway Company; 316 marine reports through the co-operation of the Hydrographic Office, United States Navy; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, and Texas; international simultaneous observations; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for March, 1889, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. On July 1, 1888, the tri-daily observations of the Signal Service were superseded by observations taken twice daily at the hours named. A protracted series of hourly observations has shown that the difference is almost inappreciable between the mean pressure obtained from two observations taken at these hours and that determined from tri-daily observations taken at eight-hour intervals.

For March, 1889, the mean pressure was highest within an area bounded by the isobar of 30.10, which extended from Manitoba southward to Kansas, the highest reading, 30.12, being noted at Bismarck, Dak. From this region there was a decrease in mean pressure westward to the north Pacific coast, where the readings fell below 29.90; southward to the southeastern slope of the Rocky Mountains, where the means were below 30.00; and eastward to Nova Scotia, where values falling below 29.85 were shown, the lowest mean reading reported, 29.82, being noted at Yarmouth, N. S. Within a well-defined area of relatively low mean pressure which occupied southeastern California and southwestern Arizona, and along the Pacific coast north of the fortieth parallel, the values fell below 29.95.

A comparison of the March, 1889, pressure chart with that of the preceding month shows a general decrease in pressure over the United States and Canada, the decrease being most marked from Oregon southeastward over the middle plateau region, on the middle Gulf coast, and along the middle Atlantic and North Carolina coasts, where at stations the mean readings were .25, or more, below those of February, 1889. Over the extreme southwestern part of California the decrease amounted to but .05; over the north-central portion of the country, and at the mouth of the Rio Grande River, to .10 or less, and over southern Florida to .12. The area of highest mean pressure

occupied the middle and northern plateau regions of the Rocky Mountains in February, while for March the highest readings were reported in the Missouri and Red River of the North valleys. The lowest mean values for March, 1889, were, as in the preceding month, noted at stations in the Canadian Maritime Provinces.

Compared with the normal pressure for the month, the mean barometer readings for March, 1889, were above the normal from the upper Mississippi valley and the upper lakes westward to the plateau regions of the Rocky Mountains, the greatest departures above the normal being shown within an area extending from Montana southward to Colorado, where they exceeded .05. In all other districts, save at stations in the lower Rio Grande valley and at Port Huron, Mich., the mean pressure was below the normal, the departures being most marked along the middle and south Atlantic and east Gulf coasts, and on the Pacific coast south of the Columbia River, where they were more than .10. At stations in the Canadian Maritime Provinces, and from the Lake region southwestward to Texas, the departures below the normal averaged from .01 to .02.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are given in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In March, 1889, the ranges were greatest in New England, where they amounted to 1.70, whence they decreased to the upper Mississippi valley and the upper lake region, where they were less than .70. From this region they increased westward to the north Pacific coast, where they amounted to 1.30, and southward to the Indian Territory, where they exceeded 1.10. Along the Atlantic coast the extreme ranges varied from .54 at Key West, Fla., to 1.70 at Portland, Me.; between the eighty-second and ninety-second meridians, .76 at Cedar Keys, Fla., to .90 at Vicksburg, Miss., and Memphis, Tenn.; between the Mississippi River and Rocky Mountains, .55 at Brownsville, Tex., to 1.11 at Fort Sill, Ind. T.; in the plateau and Rocky Mountain regions, .43 at Fort Grant, Ariz., to 1.09 at Walla Walla, Wash.; on the Pacific coast, .51 at San Diego, Cal., to 1.30 at Fort Canby and Tatoosh Island, Wash.

AREAS OF HIGH PRESSURE.

Nine areas of high pressure were observed within or near the limits of stations of observation during the month of March. Four of these areas were traced directly from the Pacific to the Rocky Mountain regions. The direction of movement, while the centre of greatest pressure remained west of the Rocky Mountains, was generally to the northeast, and after crossing the Rocky Mountains the direction changed to southeast. Four were first observed in the northern Rocky Mountain region, and with one exception they passed southeasterly over the Rocky Mountain slope to the Mississippi Valley. Of the nine areas observed only four developed sufficient energy to reach the Atlantic coast, while five disappeared by gradual decreasing pressure within the limits of the stations of observation. The region over which the high areas were most numerous during the month extends from Kansas northward to Manitoba, while four areas of high pressure disappeared while over the central Rocky mountain region.

I.—The month opened with this area covering the central Rocky Mountain region, with a secondary high area extending from Florida northward to the Saint Lawrence Valley, while a depression of considerable energy covered the west Gulf. There was a general drift of these conditions to eastward during the 1st and 2d, the area of highest pressure moving to the lower Missouri valley, while the storm of the Gulf followed the general direction of the coast line, and the high area to the eastward disappeared during the 2d. This area was last marked as central near Leavenworth on the evening of the 2d, the succeeding reports indicating that it afterwards formed a part of high area number ii, which was at that time moving eastward from the north Pacific coast.

II.—When the preceding area covered the central Rocky Mountain regions the pressure increased at stations on the north Pacific coast, indicating the advance of a second high area from the Pacific during the 2d. By the morning of the 3d the centre of greatest pressure was transferred from the Pacific coast to Montana, after which the direction of movement changed to the southward, and by the morning of the 5th the centre was transferred to southern Kansas. The area decreased in energy and separated, one portion passing towards the Gulf coast, while the other remained central over the Rocky Mountain regions and disappeared by a gradual decrease of pressure, without any marked change in weather conditions.

III.—This high area apparently formed over Dakota and Montana during the 7th, bounded by the isobar of 30.20. It moved northeasterly towards Manitoba, the pressure increasing at the centre, where it remained until the morning of the 9th, after which it moved directly south to Texas, the area covering the Rocky Mountain regions and central valleys. After reaching the latitude of central Texas the course of movement changed to the eastward, and it reached the south Atlantic coast on the morning of the 12th, after which it could not be traced as a well-marked area of high pressure. The barometer attained its maximum within this area of high pressure when it was central in northern Minnesota on the 9th, the pressure being unusually low in the lower Saint Lawrence valley, and an area of low pressure extending over the north Pacific coast. The fall of temperature attending the movement of this area over the central valleys ranged generally from 10° to 20°, except in the interior of Texas, where, during the 9th, the change amounted to 32° in twenty-four hours, attended by a dry and moderate "norther" in the interior of Texas, although heavy rains occurred in southern Texas on the night of the 10th and continued on the Texas coast until the 12th.

IV.—This area probably originated to the west of the Rocky Mountains north of British Columbia, but it was first observed on the morning of the 12th central in latitude 54° N. and longitude 117° W. It was at no time wholly within the limits of stations of observation, but passed eastward to the Atlantic with an almost uniform velocity of thirty-three miles per hour, reaching the Saint Lawrence Valley on the 14th and disappearing to the east of the Maritime Provinces on the 16th. The pressure increased near the centre of this area as it approached the centre of the continent from the west, and declined while passing to the eastward over the Lake region, but there was a second increase in pressure as the centre of the area approached the Saint Lawrence Valley, the maximum being observed at Rockliffe, Ont., on the morning of the 14th.

V and VI.—High area number v remained stationary over the Lake region from the 18th to 20th, after which it apparently formed a part of number vi, which appeared over the Pacific west of California and moved northward to Oregon between the 19th and 21st, and thence eastward to the upper Missouri valley, where the course changed to the southward on the 22d, and it disappeared while central over Kansas by a gradual decrease of pressure on the 23d.

VII.—This area also appeared on the Pacific coast to the westward of California. It was observed on the 23d and moved northeasterly along the coast until the afternoon of the 24th when it was central near Olympia, Wash. From this point it moved easterly, crossing the Rocky Mountains on the 25th and remaining central near the northern boundary line of Dakota on the 27th, after which it passed southerly over the eastern slope of the Rocky Mountains, covering the central valleys on the 28th and the south Atlantic and east Gulf states on the 29th. After reaching Florida it apparently moved northeasterly and joined high area number viii off the middle Atlantic coast on the 30th.

VIII.—This area of high pressure appeared on the afternoon

of the 28th in latitude 55° N. longitude 104° W. By the morning of the 29th it was central over eastern Dakota as a well-marked area of high pressure, attended by high northerly winds in the Missouri Valley and strong northerly winds in the Lake region, with snow and freezing weather as far south as the southern portion of the Lake region. The southern course continued until the afternoon of the 29th when the centre had reached eastern Iowa, after which it moved easterly over the Lake region and then southeasterly over the middle Atlantic states, where it was apparently re-enforced by the high area from the south, the barometer on the Atlantic coast from Florida to Halifax indicating a pressure of 30.30 and above on the morning of the 31st. This extended high area disappeared rapidly to the eastward in advance of the storm-centre which at that time covered the central Mississippi valley.

IX.—This area appeared on the Pacific to the west of central California on the morning of the 28th and moved northeastward, as has been described for high areas number vi and vii. After reaching the Oregon coast on the 30th the centre of greatest pressure passed to the east of the coast line and the movement changed to the southeast, causing the area to cover the plateau and central Rocky Mountain regions on the 31st, where it remained at the close of the month, the pressure having decreased at the centre from 30.32 to 30.18.

The following table exhibits, in a concise manner, some of the more prominent characteristics of the high areas:

No.	First observed.			Last observed.		Duration.	Velocity per h'r.	Highest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	*Days.*	*Miles.*			*Inches.*
I.....	1	44	106	40	95	1.5	20.0	1	Cheyenne, Wyo.....	30.50
II.....	2	47	127	38	105	3.0	28.0	4	North Platte, Nebr.....	30.44
III.....	7	48	106	34	77	5.0	47.0	9	Minnedosa, Manitoba ..	30.60
IV.....	12	53	118	47	62	3.5	33.0	14	Rockliffe, Ont	30.48
V.....	18	48	88	48	88	2.0	?	*	P. A. Landing, Ont.....	30.28
VI.....	19	32	124	40	102	4.0	30.0	22	Denver, Colo.....	30.56
VII.....	23	40	128	39	68	8.0	26.0	24	Portland, Oregon.....	30.52
VIII.....	28	55	104	39	68	2.5	40.0	29	Bismarck, Dak.....	30.52
IX.....	28	30	127	40	113	2.5	25.0	30	Roseburgh, Oregon.....	30.32
Means....	.....	.....	.....	.....	.....	3.6	27.7	....	.....	30.47

* 19th and 20th.

AREAS OF LOW PRESSURE.

Nine well-defined areas of low pressure were observed during the month of March, tracks of the centres of which are shown on chart i. Five of these areas originated in the Rocky Mountain regions, and in each case the movement was first to the southeast, until the centre reached the central valleys or the Texas coast, when the movement changed from east to northeast. From an inspection of chart i it will be seen that the areas of low pressure to the northward changed direction at points farther to the east than the areas which were traced over the southern portion of the country. Of the nine areas of low pressure observed, six reached the Atlantic, whilst two disappeared in the central valleys, and one passed northward along the north Pacific coast and finally disappeared without causing any disturbance east of the Rocky Mountains.

I.—On the last day of the preceding month there were indications that a storm was developing south of Texas, and on the first of the month the centre of this disturbance was near Galveston, attended by heavy rains in the Gulf states. The centre of disturbance apparently followed the coast line from Texas to eastern Florida, over which section it passed during the 3d. Whilst moving over the easterly portion of this track along the Gulf coast it developed but slight energy at the land stations, the maximum wind velocity being twenty-six miles at Pensacola. After reaching the south Atlantic coast the course changed to the northward, and on the 4th it was central off the middle Atlantic coast, attended by severe northeasterly gales, which continued over the New England coast until the 7th. The disturbance increased in energy as it moved northerly, the vessel reports indicating that the gales were unusually severe between latitude N. 40° and N. 43° and longitude W. 60° and W. 70°. Near latitude N. 40° and longitude W. 67° the course of this storm changed to north and passed along the New England coast from Maine to the Saint Lawrence Valley, apparently reaching its maximum energy on the 6th while off the New England coast. On the 9th it was central in the lower Saint Lawrence valley, when the course changed to the east and it passed over the Atlantic, after which it is described under the head of north Atlantic storms as number 5. This storm was remarkable on account of its duration, it having remained near the coast of the United States and controlled the weather conditions over a large area during the first ten days of the month, while it continued its course over the Atlantic with sufficient energy to render it possible to trace it during two days, making the life of the storm as determined by actual observations eleven days, while the indications are that it continued its course over the Atlantic. Descriptions of the storms attending this depression, as noted at Signal Service stations, are given under the heading "Local storms."

II.—The most extended storm which occurred on the Pacific coast during the month was central west of Oregon on the 11th. It apparently originated over the Pacific and approached the coast from the southwest, moving slowly northward after the centre reached the coast line, the barometer falling to 29.22 at the mouth of the Columbia River on the 14th, causing an unusual barometric gradient to the southeast. It was attended by strong winds and heavy rains over Washington Territory, Oregon, and California, the rains extending inland over the entire coast and plateau regions, and doubtless greatly improving the crop conditions over the Pacific coast regions, where the seasonal moisture is very much less than usual. This storm continued its course northward beyond the limits of stations of observation, and when last located it was central near the coast in latitude N. 50° on the morning of the 15th, there being no indication that it passed to the eastward of the Rocky Mountains, although low area number v, which developed in the central Rocky Mountain region, was apparently a secondary disturbance originating within the depression which attended this storm.

III.—This depression appeared north of Manitoba on the 12th, and moved easterly to the lower Saint Lawrence Valley. It apparently inclined towards the lake region as it passed eastward north of that section, and afterward followed the course of the Saint Lawrence Valley until it disappeared over Newfoundland on the 14th. It was at no time central within the limits of the United States, but it caused severe gales over the Maritime Provinces and strong westerly winds on the New England coast. The barometric gradient in the west quadrants was increased by a rapid advance of an area of high pressure which separated this storm from that traced as number ii on the Pacific coast. The westerly gales in the Saint Lawrence Valley were severe, the wind at Anticosti Island, Gulf of Saint Lawrence, reaching fifty-two miles per hour at 8 a. m. of the 14th. This storm continued its course over the Atlantic with increasing energy, and was afterwards traced as number 8 in the descriptions of north Atlantic storms.

IV.—This storm was at no time central within the limits of stations of observation, but its course along the Gulf stream from latitude N. 30° and N. 35° can be readily traced from observations taken at the Signal Service coast stations. It was probably central east of northern Florida on the 14th, although there are indications that it originated farther to the south. Heavy rains occurred on the south Atlantic coast on that date, attended by northerly gales, which extended to the southern New England coast on the 15th, upon which date the centre of disturbance was in about latitude N. 32°, south of Hatteras. The marine reports received indicated that it continued its northeasterly course during the 16th, after which it moved northerly towards Nova Scotia, and thence eastward over the

Atlantic, where it has been traced as number 7 of North Atlantic storms. Descriptions of the storms and high tides attending this depression, as noted at Signal Service stations, are given under the heading "Local storms."

V.—This storm has been previously referred to as a secondary disturbance attending the severe storm traced as number ii on the Pacific coast. It developed in the central Rocky Mountain regions, and was first located on the morning of the 14th as central in eastern Colorado. In this connection it may be well to note that the morning weather map of the 14th exhibited four separate storms—one on the north Pacific coast, one in the central Rocky Mountain region, one off the Florida coast, and the fourth over the Maritime Provinces. Number v moved southeasterly during the 14th, the centre passing over Indian Territory, after which it moved to the Mississippi Valley as an extended barometric trough covering the central valleys, the centre apparently moving to the northeastward attended by a loss of energy and increasing pressure at the centre of the disturbance. It disappeared during the 16th while central in the upper Mississippi Valley, without causing any marked change in the weather conditions to the eastward. It should also be noted that the minimum barometric pressure within each of the four areas central within the limits of the weather map on the 14th was recorded on that date.

VI.—Number vi developed in the central Rocky Mountain region on the 16th in the southeastern portion of a barometric trough which passed eastward from the Pacific, the principal disturbance apparently passing north to British Columbia, while this storm moved southeasterly, developing considerable energy as it passed from Colorado to the lower Mississippi valley. The winds attending this storm were unusually strong on the eastern slope of the Rocky Mountains south of the Missouri Valley, and heavy rains with severe local storms occurred on the 17th from Kansas and Missouri southward to Texas. After reaching latitude N. 35° the storm moved eastward over the Gulf and south Atlantic states, attended by general rains south of the Lake region, the centre probably reaching the Gulf Stream on the 19th, where it moved northeasterly and continued its course as number 9 of the storms of the north Atlantic.

VII.—The weather map of 8 a. m. of the 20th exhibited a barometric depression extending from the Rio Grande Valley northward to British America, with indications that a storm-centre was approaching from the region north of Dakota. The 8 p. m. weather chart of the same date exhibited a well-defined depression central in western Texas, which was apparently being forced southeasterly by an area of high pressure then central on the north Pacific coast. This storm continued its course southeasterly to the Gulf coast where it changed its course to northeast during the 22d, attended by heavy rains in the lower Mississippi valley and strong northerly winds on the Texas coast after the centre had passed over Louisiana. Strong southeasterly gales were also reported on the east Gulf coast on the morning of the 24th. After passing inland the winds diminished in force and it moved off the North Carolina coast as a disturbance of slight energy, although the reports from the Atlantic and from Sydney, C. B. I., of the 26th indicate that it was attended by severe gales after it left the coast.

VIII.—This was a slight disturbance which was central north of the Lake region on the 26th, although the preceding weather map exhibits a slight disturbance west of Lake Superior. It moved southeasterly to Lake Huron, the pressure decreasing at the centre during the movement, attended by brisk to high westerly winds over the Lake region on the 27th. From Lake Huron it passed easterly, inclining to the lower Saint Lawrence valley, this movement being followed by showers over the eastern portion of the country as far south as Tennessee and North Carolina. It extended in area as it approached the Atlantic, and was followed by a secondary disturbance which developed in the upper Saint Lawrence valley on the 29th.

IX and IX *a*.—The a. m. weather map of the 29th showed the presence of two areas of high pressure, the one covering the upper Mississippi and Missouri valleys, and the other the Pacific coast, while between these and over the Rocky Mountain regions the pressure was below 29.9, and in the regions north of Montana a well-marked area of low pressure had formed, the barometer reading 29.54 at Medicine Hat, N. W. T. and general rains were reported from the Rocky Mountains west to the north Pacific coast. This barometric trough moved slowly to the east, the storm-centre north of Minnesota inclining to the southeast, following the general course of the Missouri River, while a second disturbance (ix*a*) in the southern portion of this trough moved eastward over New Mexico and Texas, inclining to the northeast, the two disturbances uniting at the mouth of the Missouri on the morning of the 31st, forming an extended depression of an oval form, covering the country from the lower lake region southwest to Texas. At the close of the month this storm had reached the Atlantic coast, but the centre of disturbance was in the upper Ohio valley. During the passage of this low area over Texas strong gales occurred on the Texas coast, and the southerly winds reached a velocity of forty-eight miles per hour at Fort Sill, Ind. T., and Fort Elliott, Tex.

The following table exhibits the principal facts regarding these low areas:

No.	First observed.			Last observed.		Duration.	Velocity per h'r.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Date.	Station.	Reading.
		°	°	°	°	*Days.*	*Miles.*			*Inches.*
I.....	1	27	97	49	60	8.5	16.0	7	Portland, Maine.....	28.79
II.....	11	43	126	50	125	3.5	6.5	14	Tatoosh Island, Wash..	29.18
III.....	12	53	98	50	59	2.0	42.0	14	Anticosti I'd, G. of St. L.	29.40
IV.....	14	30	79	38	65	3.0	15.0	14	Charleston, S. C.....	29.52
								15	Hatteras, N. C.....	29.52
V.....	14	39	103	43	90	2.0	25.0	14	Fort Elliott, Tex.....	29.38
VI.....	16	40	105	33	76	3.0	26.0	17	Fort Sill, Ind. Ter.....	29.32
VII.....	20	34	105	36	77	5.0	20.0	25	Hatteras, N. C.....	29.56
VIII....	26	50	88	51	65	2.0	30.0	28	Anticosti I'd, G. of St. L.	29.53
IX.....	29	50	110	40	83	2.0	34.0	29	Medicine Hat, N. W. T..	29.54
IX *a*....	30	36	108	39	91	1.0	43.0	30	Fort Elliott, Tex.....	29.70
Mean.	....	.....	.....	.....	.....	3.2	25.8	....	.....	29.38

NORTH ATLANTIC STORMS FOR MARCH, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during March, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Twelve depressions have been traced, the average number traced over the north Atlantic Ocean for March during the last six years being ten. Of the depressions traced for March, 1889, five were continuations of areas of low pressure which first appeared over the American continent; two were first noted south of the thirtieth parallel, from whence they moved northward; two appeared southeast, and one east, of Newfoundland, and two apparently developed east of the twenty-fifth meridian. The storms generally pursued normal east to northeast paths and were well distributed over the ocean.

Over and near the British Isles the weather continued generally stormy during the first decade of the month, and from the 18th to 20th, inclusive, the severest gales occurring on the 19th and 20th, when the barometric pressure fell to, or below, 29.00 (737). Over mid-ocean unsettled weather was almost

continuous from the 5th to 28th, with pressure below the normal and gales of varying force, the severest storms being noted on the 12th and 18th, when barometer readings falling to about 29.20 (742) were reported. West of the forty-fifth meridian the general character of the weather was stormy, the storms of the first decade being particularly severe, and occasioning considerable loss and damage to shipping. The following report by Gen. Russell Hastings, voluntary observer at Hamilton, Bermuda, indicates the general character of the weather in that locality during the passage of low area i: "There has been during the past week a wonderful depression of barometric pressure. The highest barometer noted since March 1st was 29.92 (760), at 9 p. m., 3d. The pressure gradually decreased, and at 9 p. m. of the 4th had fallen to 29.78 (756). At 2 a. m. of the 5th the storm burst upon us from the sw., with light rain and very high winds. At 2 p. m. of the 5th the barometer recorded 29.31 (744), the lowest point reached since I have been taking observations (Sept. 1, 1888). At 3 p. m., 5th, the sky was clear, with a dead calm, but the barometer continued low. I am unable to say what the force of the wind was from 2 a. m. to 2 p. m. of the 5th, as there is no anemometer at this station, but I am quite sure I have seen a stronger wind here with barometer above 30.00 (762). Since the morning of the 5th light west winds have prevailed, with passing showers and bright sunshine, and frequently a clear sky. I judge a fearful cyclone has passed up the eastern edge of the Gulf Stream some two hundred or more miles west of here."

As compared with the corresponding month of previous years, March, 1889, was unusually stormy, more particularly over the western part of the ocean. The depressions, while exceeding in number the average for the month, were not of exceptional energy for the season and were chiefly characterized, as has been noted in preceding years, by their slow progressive movement, which resulted in long continued unsettled weather in the regions where they prevailed.

The following are brief descriptions of the depressions traced:

1.—The presence of a depression of considerable energy southeast of the Banks of Newfoundland was shown by reports of the 1st. By the 2d the centre of disturbance had apparently advanced north of west, with a marked loss of energy, after which it probably moved south of west and united with depression number 3 which had advanced from southeast of Bermuda.

2.—This was a depression of moderate energy whose centre was located west of the British Isles on the 1st and 2d, whence it apparently advanced eastward, attended until the 5th by fresh gales east of the twentieth meridian.

3.—This depression is first located in about N. 27°, W. 54°, under date of the 2d, whence it moved northwestward to the thirty-sixth parallel by the 3d, after which it recurved to the eastward and advanced to the British Isles by the 7th, attended throughout by fresh to strong gales and a gradual decrease in barometric pressure, the lowest barometer readings being shown to the southward of the British Isles on the 7th and 8th, when they fell to about 29.30 (744).

4.—This depression apparently advanced from the vicinity of the Azores to the Bay of Biscay from the 8th to 10th, inclusive, its centre being located about midway between the Azores and the British Isles at noon, Greenwich time, of the 9th. The depression possessed considerable energy, and appeared to move eastward over the continent of Europe after the 10th.

5.—This depression, a continuation of low area i, moved slowly northeastward from the south Atlantic coast (to which it had advanced from the west coast of the Gulf of Mexico) from the 3d to the 6th, inclusive, after which it recurved to the northwestward, and on the morning of the 7th was central off the middle New England coast with barometric pressure falling below 28.80 (732). After the 7th the centre of disturbance moved slowly east of north until the 9th, when it was located near Anticosti Island, Gulf of Saint Lawrence, and then recurved eastward over northern Newfoundland and apparently disappeared north of the region of observation after the 11th. This depression was attended by gales of great violence, which wrought considerable destruction to shipping along and off the coast of the United States, the greatest barometric depression being shown on the 7th, after which a loss of energy was apparent, although strong gales continued off the American coast to the thirtieth parallel until the 12th. On the 6th, when the depression was central in about N. 40°, W. 66°, with pressure falling to, or near, 29.00 (737), the barometer reading at Saint John's, N. F., was 30.02 (763). It will be seen from these readings that at the time the storm-centre recurved to the northwest from a normal east-northeast course there was a barometric gradient of about one inch in 600 geographical, or about 700 statute, miles in its line of advance.

6.—This depression appeared east of the Grand Banks on the 12th, and was a subsidiary development to, or possibly a continuation of, depression number 5. By the 13th the storm-centre had moved eastward to the thirty-first meridian, after which it apparently moved northward and dissipated. On the 12th pressure falling to about 29.30 (744) and strong to whole gales were reported, after which a loss in energy was shown.

7.—This depression, a continuation of low area iv, moved slowly in a general northeast direction and disappeared over mid-ocean north of the fifty-fifth parallel after the 21st. From the 14th to 18th, inclusive, very severe gales attended the passage of this depression; subsequent to that date moderate to fresh gales were reported. From the 15th to 17th very high tides, which caused considerable damage to property, occurred along the middle Atlantic coast.

8.—This depression was a continuation of low area iii, and advanced eastward over the southern extremity of Newfoundland during the 14th. By the 18th the centre of depression had moved northeastward to the twenty-fifth meridian, after which it recurved southeastward and disappeared south of the British Isles after the 19th. The depression augmented in energy during its passage and on the 18th and 19th barometer readings, ranging below 29.00 (737), were reported south of the British Isles.

9.—This depression was a continuation of low area vi which advanced eastward from the south Atlantic coast during the 19th. Moving east-northeast the storm-centre disappeared over mid-ocean after the 23d. The gales attending this depression were quite severe, and on the 20th and 21st destructive high tides occurred from Norfolk, Va., to Long Island, N. Y.

10.—This depression moved north-northeast from southeast of the Banks of Newfoundland during the 24th and 25th, attended by moderate to fresh gales, after which it apparently passed northward beyond the region of observation.

11.—This depression was central on the 26th south of Newfoundland, with pressure falling to, or below, 29.10 (739), and strong to whole gales. By the 27th the storm-centre had advanced northeastward to the fortieth meridian, without evidence of diminished energy, after which it disappeared north of the region of observation.

12.—This was a depression of small energy which moved northeastward from the Gulf of Saint Lawrence over Newfoundland during the 30th.

OCEAN ICE IN MARCH.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for March during the last seven years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
March, 1882	42 30	50 00	March, 1882	46 30	46 00
March, 1883	41 46	49 48	March, 1883	48 40	43 03
March, 1884	41 20	54 06	March, 1884	45 00	40 15
March, 1885	40 55	49 04	March, 1885	45 57	43 15
March, 1886	40 20	49 02	March, 1886	47 20	44 40
March, 1887	41 00	49 07	March, 1887	45 31	42 56
March, 1888	42 30	50 37	March, 1888	47 23	46 56
March, 1889	44 20	53 00	March, 1889	44 20	53 00

No icebergs were reported for March, 1889. On the 2d the

s. s. "Devonia" encountered thin field ice in N. 44° 20′, W. 53° 00′, this being the only field ice noted during the month. The entire absence of icebergs, and the almost entire absence of field ice, over and near the Banks of Newfoundland during March, 1889, constitutes a noteworthy and very unusual feature, as during the corresponding month of the last seven years icebergs and field ice have been reported in large quantities in that region. During this period the average southern limit of ice for March has been about N. 41° and the average eastern limit about W. 44°.

OCEAN FOG IN MARCH.

Fog at Saint Johns, N. F., 1st, 2d, 3d, 4th, 6th, 7th, 8th, 20th, and 26th.

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on seventeen days, as compared with thirteen days for February, 1889, and sixteen days for March, 1888. Between the fifty-fifth and sixty-fifth meridians fog was reported on twelve days, as compared with four days for February, 1889, and six days for March, 1888. To the westward of the sixty-fifth meridian fog was reported on seven days, as compared with three days for February, 1889, and six days for March, 1888. In each of the regions referred to the development of fog attended the approach or passage of areas of low barometric pressure, and the unusual frequency of its occurrence may be attributed to the numerous and energetic storms which traversed the western portion of the ocean during the month..

The following are limits of fog-areas on the north Atlantic Ocean during March, 1889, as reported by shipmasters:

Date.	Entered.		Cleared.		Date.	Entered.		Cleared.	
	Lat. N.	Lon. W.	Lat. N.	Lon. W.		Lat. N.	Lon. W.	Lat. N.	Lon. W.
	° ′	° ′	° ′	° ′		° ′	° ′	° ′	° ′
2-3	44 00	56 00	41 50	63 00	16-17	40 35	65 40	40 50	64 00
2-3	44 58	53 30	44 10	56 20	16-17	40 28	66 52	40 46	64 00
2-3	40 09	66 08	39 41	69 39	16-18	40 39	65 30	42 04	58 00
2-4	45 17	53 21	43 15	61 50	17	40 48	67 00	40 40	69 30
3-4	40 52	67 50	40 30	69 00	17	41 07	65 55	40 34	70 00
3-4	42 16	61 05	40 55	68 30	18	42 45	60 50	42 41	62 28
3-4	43 00	60 00	42 10	63 40	18-19	44 05	52 06	43 06	58 39
3-4	45 29	47 19	46 28	45 16	17-19	40 40	65 00	39 50	68 10
4	42 07	52 24	42 53	49 07	18-19	44 10	48 29	43 06	52 16
4-5	At Halifax, N. S.				19-20	44 39	52 00	43 18	57 57
6	40 59	63 50	40 57	64 14	19-20	44 54	44 42	43 11	51 10
6	42 00	51 00	42 00	50 00	20	45 40	46 48	45 02	49 00
6-7	At Halifax, N. S.				20	43 04	52 57	43 02	54 06
7-8	43 12	50 00	42 40	52 55	20-21	45 59	43 47	45 45	49 55
7-8	43 22	48 20	42 43	50 00	28	43 40	50 30	44 50	48 05
8	44 05	45 22	43 45	46 31	25	44 57	48 52	44 47	49 47
8-9	47 00	46 26	44 53	51 17	25	35 43	73 50	35 45	73 48
9	44 00	47 59	43 24	49 40	25-26	42 00	50 30	42 00	51 30
9	44 40	53 25	45 20	51 00	29	44 50	60 00	44 50	62 00
9-10	47 00	46 50	45 10	49 20	30	42 21	52 53	42 22	53 15
9-10	46 30	48 10	47 15	46 00	30-31	42 57	50 40	42 44	52 22

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for March, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departures from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature show the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above.

The mean temperature was highest over the southern extremity of Florida, and in the lower valleys of the Colorado and Gila rivers, where the values rose above 65°. In Florida south of the thirtieth parallel, along the middle and west Gulf coast, in southwestern Arizona and southeastern California, and at stations in the valley and to the eastward of the San Joaquin River and Tulare Lake, Cal., the mean temperature was above 60°. The mean temperature was lowest north of a line traced through Minnedosa and Winnipeg, Manitoba, and thence eastward to the extreme northern shore of Lake Superior, where the readings were below 25°. Values below 32° were reported north of a line traced irregularly east-southeast from Qu'Appelle, N. W. T., to Lake Ontario, and thence north of east to Cape Breton Island. Within an area extending over adjoining portions of Arizona, New Mexico, Utah, and Colorado the means fell below 35°.

The mean temperature was below the normal south of a line traced from central Arizona eastward to middle Alabama, and thence northeastward to the Atlantic coast in about the latitude of southern Delaware, the greatest departures below the normal being noted in the lower Rio Grande valley, where they exceeded 5°. In all districts north of the line referred to and on the Pacific coast the month was warmer than the average March, the greatest departures above the normal being shown in northwestern Minnesota, northeastern Dakota, and southwestern Manitoba, where they were more than 15°. Over a greater portion of the country north of the fortieth parallel the temperature was 5°, or more, above the normal. On the Pacific coast the departures above the normal were less than 5°, except in the lower valley of the Columbia River.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.	°	Below normal.	°
Saint Vincent, Minn	16.4	Rio Grande City, Tex	5.5
Bismarck, Dak	15.2	Jacksonville, Fla	3.9
Minnedosa, N. W. T.	15.0	Key West, Fla	3.6
Marquette, Mich.	10.1	Galveston, Tex	3.0
Portland, Oregon	5.8	Savannah, Ga.	2.7

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for March, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for March during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of March.	(2) Length of record.	(3) Mean for March, 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for March.			
						Highest.	Year.	Lowest.	Year.
Arkansas.		°	*Years*	°	°	°		°	
Lead Hill	Boone	48.5	7	50.1	+1.6	55.4	1882	45.5	1885
California.									
Sacramento	Sacramento	54.8	36	54.5	−0.3	59.8	1853	48.8	1880
Colorado.									
Fort Lyon	Bent	41.6	20	43.3	+1.7	47.3	1879	29.6	1867
Connecticut.									
Middletown	Middlesex	32.2	20	37.0	+4.8	40.7	1871	25.7	1872
Florida.									
Merritt's Island	Brevard	65.3	6	61.6	−3.7	71.1	1884	61.6	1889
Georgia.									
Forsyth	Monroe	56.9	15	57.4	+0.5	61.7	1880'82	51.4	1885
Illinois.									
Peoria	Peoria	38.3	33	43.1	+4.8	45.8	1871	29.4	1867
Riley	McHenry	31.3	32	36.2	+4.9	41.7	1878	23.8	1872
Indiana.									
Vevay	Switzerland	42.6	22	45.9	+3.3	50.7	1878	35.7	1885
Iowa.									
Cresco	Howard	25.8	17	35.1	+9.3	42.3	1878	19.6	1888
Monticello	Jones	31.9	35	39.4	+7.5	45.8	1878	23.8	1867
Logan	Harrison	34.7	15	42.1	+7.4	48.0	1878	28.3	1875
Kansas.									
Lawrence	Douglas	42.3	25	41.6	−0.7	51.2	1868	34.2	1876
Wellington	Sumner	43.6	10	46.9	+3.3	49.6	1879	39.0	1883

Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of March.	(2) Length of record.	(3) Mean for March, 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for March. Highest.	Year.	Lowest.	Year.
Louisiana.		°	Years	°	°	°		°	
Grand Coteau	Saint Landry	62.1	6	60.4	−1.7	66.2	1884	59.5	1885
Maine.									
Cornish	York	28.5	32	33.3	+4.8	36.2	1871	20.7	1863
Maryland.									
Cumberland.....	Allegany	36.8	30	41.9	+5.1	46.0	1878	30.0	1875
Massachusetts.									
Amherst	Hampshire..	32.6	53	37.1	+4.5	40.5	1871	24.5	1843
Newburyport	Essex	32.1	10	36.7	+4.6	36.7	1880	27.0	1885
Somerset	Bristol	33.9	16	36.9	+3.0	39.8	1878	28.2	1885
Michigan.									
Kalamazoo	Kalamazoo ..	30.6	13	39.0	+8.4	42.2	1878	22.5	1885
Thornville.....	Lapeer	30.5	12	36.2	+5.7	41.1	1878	21.0	1885
Minnesota.									
Minneapolis	Hennepin ...	24.5	24	34.9	+10.4	43.6	1878	11.6	1867
Montana.									
Fort Shaw	Lewis & Clarke	32.5	18	41.8	+9.3	41.8	1889	21.7	1870
New Hampshire.									
Hanover	Grafton.....	27.7	55	31.6	+3.9	35.5	1871	19.0	1872'85
New Jersey.									
Moorestown	Burlington ..	37.4	26	39.8	+2.4	45.4	1871	29.7	1885
South Orange	Essex	35.5	17	39.0	+3.5	42.5	1878	28.5	1872
New York.									
Cooperstown	Otsego	27.3	35	31.4	+4.1	37.2	1871	18.3	1885
Palermo	Oswego.....	27.0	29	31.8	+4.8	38.1	1878	17.1	1885
North Carolina.									
Lenoir	Caldwell.....	45.5	15	47.6	+2.1	51.6	1878	35.1	1877
Ohio.									
N'th Lewisburgh.	Champaign ..	37.6	57	42.1	+4.5	48.0	1842	21.0	1843
Wauseon.....	Fulton	30.6	20	37.2	+6.6	43.2	1878	24.5	1885
Oregon.									
Albany	Linn.....	47.0	9	52.7	+5.7	53.0	1885	40.4	1880
Eola.....	Polk.....	45.2	19	51.7	+6.5	54.2	1884	38.8	1880
Pennsylvania.									
Dyberry	Wayne	28.4	24	33.3	+4.9	36.9	1878	19.5	1885
Grampian Hills..	Clearfield....	30.3	24	36.6	+6.3	40.4	1878	20.1	1885
Wellsborough ...	Tioga.....	30.8	9	35.4	+4.6	37.6	1882	22.4	1885
South Carolina.									
Statesburgh.....	Sumter.....	53.0	8	52.2	−0.8	59.0	1882	48.3	1885
Tennessee.									
Austin.....	Wilson	47.3	18	51.2	+3.9	57.3	1868	40.8	1876
Milan	Gibson	47.0	6	50.2	+3.2	50.2	1887'89	43.7	1885
Texas.									
Fort Concho	Tom Green..	58.5	16	57.2	−1.3	63.9	1879	51.8	1888
New Ulm	Austin	62.6	16	59.9	−2.7	68.4	1879	57.3	1888
Vermont.									
Strafford	Orange	25.6	16	32.6	+7.0	33.8	1878	17.2	1883
Virginia.									
Bird's Nest	Northampt'n	45.2	20	43.2	−2.0	54.1	1878	35.8	1872
Wytheville	Wythe.....	42.4	24	43.8	+1.4	49.0	1878	37.0	1870'81,
Wisconsin.									
Madison	Dane	29.9	24	37.1	+7.2	37.1	1889	23.2	1888
Washington.									
Fort Townsend ..	Jefferson	44.5	16	49.4	+4.9	50.7	1885	38.7	1880

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported was 90°, at Yuma, Ariz. Within a limited area in the middle Sacramento valley, in western California south of the thirty-seventh parallel, in the Colorado Valley to southern Nevada, in southern Arizona and New Mexico, a greater portion of Texas, northern Louisiana, southern Arkansas, northern Mississippi and Alabama, southwestern Tennessee, northeastern Florida, and southeastern Georgia the temperature rose above 80°. The lowest maximum temperature, 49°, was noted at Block Island, R. I. At a number of stations in the more northern districts the highest temperature recorded during the periods of observation was reported. At Eastport, Me., with a record of sixteen years, the maximum temperature for March, 1889, was 1° above the highest previous reading for the month, which occurred in 1878; at Columbus, Ohio, 11 years record, 1° above maximum of 1886; Duluth, Minn., 17 years record, 2° above maximum of 1878 and 1879; Moorhead, Minn., 9 years record, 9° above maximum of 1886; Saint Vincent, Minn., 9 years record, 21° above maximum of 1881; Fort Buford, Dak., 11 years record, 2° above maximum of 1879 and 1882; Fort Assinaboine, Mont., 9 years record, 2° above maximum of 1885; Linkville, Oregon, 6 years record, 2° above maximum of 1887; Fort Canby, Wash., 6 years record, 2° above maximum of 1885; Olympia, Wash., 12 years record, 3° above maximum of 1885; San Francisco, Cal., 19 years record, 1° above maximum of 1887. Over the southern portion of the country the maximum temperature was below the maximum reported for the corresponding month of previous years by values varying from 5° at Charlotte, N. C., to 12° at Galveston, Tex., and 19° at San Diego, Cal.

The lowest temperatures were reported in northern Minnesota and Dakota, and northeastern Montana, where they fell below 0° (zero), the lowest reading, —9 being noted at Saint Vincent, Minn. The highest minimum temperature reported was 60°, at Key West, Fla. Unusually low temperature has not been reported, and at a large majority of stations the minimum readings were considerably above the lowest values previously noted for March, notably in New England, the Lake region, the Missouri valley, and the northern slope of the Rocky Mountains, where, at stations, the readings were 30°, or more, above the lowest March values of previous years.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred over northern Minnesota and Dakota, and northeastern Montana, where they exceeded 70°. From this region the ranges decreased eastward to the south New England coast, where they were less than 30°, southeastward to southern Florida, where they were less than 20°, and westward to the Pacific coast, where they amounted to less than 30° along the coasts of Washington and northern California. Within a limited area, embracing the north-central part of Indian Territory and adjoining portions of Kansas, the monthly ranges were about 60°.

The following are some of the extreme monthly ranges:

Greatest.	°	Least.	°
Poplar River, Mont	79.0	Key West, Fla	19.0
Saint Vincent, Minn	78.0	Tatoosh Island, Wash	21.0
Moorhead, Minn	70.0	Block Island, R. I	25.0
Fort Supply, Ind. T	61.0	Eureka, Cal	27.0
Fort Elliott, Tex	59.0	Galveston, Tex	28.0
Wichita, Kans	58.0	Hatteras, N. C	28.0

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for March, 1889:

Stations.	Temperature at bottom. Max.	Min.	Range.	Monthly mean.	Mean temperature of air at the station.
	°	°	°	°	°
Canby, Fort, Wash	54.8	48.5	6.3	50.9	51.2
Cedar Keys, Fla	75.3	53.0	22.3	64.5	60.1
Charleston, S. C	61.1	49.0	12.1	55.0	55.0
Eastport, Me	37.6	36.0	1.6	36.8	33.0
Galveston, Tex	62.0	55.5	6.5	59.0	60.0
Key West, Fla	76.2	66.7	9.5	72.5	69.4
New York City	39.8	32.9	6.9	36.6	41.5
Pensacola, Fla	63.0	56.4	6.6	59.9	58.8
Portland, Oregon	54.5	41.0	13.5	49.7	53.8

FROST.

Frost destructive to vegetation was not reported south of the thirty-fifth parallel. In the south Atlantic states frost was not noted along, or near, the coast line, and the most southerly station reporting frost in that district was Quitman, Ga. In the Gulf states frost was reported as far south as the latitude of New Orleans, La., on five dates in Louisiana, and in Texas on three dates, at New Ulm. On the Pacific coast frost was frequently noted in Washington and Oregon. In California Sacramento was the only station reporting frost, where it occurred on the 19th.

LIMITS OF FREEZING WEATHER.

The southern and western limits of freezing weather for March, 1889, are shown on chart v. A line representing the southern limit is traced from north of Hatteras, N. C., southwestward to central Georgia, thence westward through central

Alabama and Mississippi to the Mississippi River, where it recurves northward to Tennessee, and from thence trends west-southwest to the Rio Grande Valley. A line showing the western limit of freezing weather is traced irregularly northwestward from southeastern Arizona to the Oregon coast, where it curves eastward over the valley of the Columbia River, and is continued northward between Port Angeles and Tatoosh Island, Wash.

As compared with the lines representing similar data for February, 1889, it is shown that for the current month the limit of freezing weather was about ten degrees farther north on the Atlantic coast, and from five to ten degrees farther north in the Gulf states. On the Pacific coast there was a general and marked advance eastward of the limit of freezing weather, the coast of western Oregon being the only region where the temperature fell below 32°.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for March, 1889, as determined from the reports of nearly 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The greatest precipitation in March, 1889, occurred at interior stations in California north of the thirty-eighth parallel, where it amounted to more than ten inches. No monthly rainfalls to exceed eight inches were reported east of the Pacific slope. Over the eastern portion of the country the greatest amount of precipitation was noted at stations on the Virginia coast, in eastern Maryland, southern Delaware, southern New Jersey, the southern extremity of Florida, in central and northeastern Arkansas, and southern Mississippi, where it amounted to more than six inches. Over a large portion of the upper lake region and the upper Mississippi and Missouri valleys the monthly precipitation was less than one-half inch, while at stations on the southeastern and middle slopes and the western part of the middle plateau region of the Rocky Mountains the amount varied from .00 to one-half inch.

The precipitation was above the normal in California south of the fortieth parallel, in Montana and northeastern Minnesota, southwestern Missouri, southern Kansas, Arkansas, and thence southwestward to the Gulf coast and westward to the Pacific, except within an area extending over parts of western Texas, southern New Mexico, and southeast Arizona, over southern Florida, along the Atlantic coast from Atlantic City, N. J., to the lower South Carolina coast, except at Hatteras and Kitty Hawk, N. C., and over a part of the northern plateau region. The greatest departures above the normal occurred over the southern extremity of Florida, where they amounted to more than six inches, and along the west-central coast of California, and in central Arkansas, where they were more than four inches. The precipitation was generally below the normal from New England westward to the Pacific, and from the Lake region southward to the Gulf of Mexico, the greatest departures below the normal being reported in northwestern Georgia, southwestern Alabama, and northwestern Oregon, where they exceeded four inches.

In the several districts where the precipitation was in excess the percentages above the normal were about as follows: middle Atlantic states, 5 per cent.; Florida, 93 per cent.; Rio Grande Valley, 117 per cent.; west Gulf states, 20 per cent.; middle slope, 50 per cent.; southern slope, 4 per cent.; southern plateau, 9 per cent.; northern plateau, 30 per cent.; middle Pacific coast, 137 per cent.; southern Pacific coast, 107 per cent. In the districts where the precipitation was deficient the percentages of the normal were about as follows: New England, 60 per cent.; south Atlantic states, 85 per cent.; east Gulf states, 66 per cent.; Ohio valley and Tennessee, 50 per cent.; lower lake region, 60 per cent.; upper lake region, 40 per cent.; extreme northwest and upper Mississippi valley, 50 per cent.; Missouri Valley, 97 per cent.; northern slope; 75 per cent.; middle plateau and north Pacific coast, 70 per cent.

Chart iv exhibits the normal distribution of precipitation for March as determined from eighteen years' observations. This chart shows that the heaviest precipitation for the month occurs in the extreme northwest part of Washington, where it commonly exceeds ten inches. It averages eight inches, or more, in parts of western Washington and Oregon, northeastern and southwestern California, and northern Mississippi. The greatest average amount of precipitation in the Rocky Mountain regions is shown in limited areas located in north-central Colorado and south-central Utah, where it amounts to four inches, or more. Over a considerable portion of the Rocky Mountain districts the precipitation for March falls below one-half inch.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for March, 1889; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for March during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of March.	(2) Length of record.	(3) Total for March, 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for March.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	3.75	7	3.61	—0.14	4.87	1886	2.84	1887
California.									
Sacramento	Sacramento	2.87	39	7.20	+4.33	10.00	1850	0.09	1883
Colorado.									
Fort Lyon	Bent	0.41	15	0.64	+0.23	1.87	1868	0.00	1879
Connecticut.									
Middletown	Middlesex	4.64	27	2.55	—2.09	9.49	1876	1.12	1874
Florida.									
Merritt's Island	Brevard	2.92	11	1.03	—1.89	7.92	1878	0.76	1882
Georgia.									
Forsyth	Monroe	7.51	15	2.48	—5.03	12.87	1875	1.37	1878
Illinois.									
Peoria	Peoria	2.57	34	1.50	—1.07	5.82	1859	0.24	1885
Riley	McHenry	2.67	38	1.56	—1.11	7.23	1876	0.29	1885
Indiana.									
Logansport	Cass	3.13	14	1.51	—1.62	6.89	1861	0.95	1896
Vevay	Switzerland	3.89	24	0.85	—3.04	6.30	1882	0.85	1889
Iowa.									
Cresco	Howard	1.91	17	0.22	—1.69	4.55	1888	0.22	1889
Monticello	Jones	2.59	34	0.15	—2.44	6.34	1877	0.07	1869
Logan	Harrison	2.12	21	0.69	—1.43	4.50	1876	0.30	1885
Kansas.									
Lawrence	Douglas	2.29	21	2.30	+0.01	5.47	1888	0.37	1879
Wellington	Sumner	1.24	10	2.97	+1.73	2.97	1889	0.00	1879
Louisiana.									
Grand Coteau	St. Landry	5.92	6	3.69	—2.23	10.20	1884	2.26	1887
Maine.									
Cornish	York	4.13	32	3.17	—0.96	9.63	1859	1.42	1874
Maryland.									
Cumberland	Allegany	2.71	17	3.52	+0.81	5.14	1884	0.50	1872
Massachusetts.									
Amherst	Hampshire	3.46	53	1.02	—2.44	7.14	1876	0.89	1858
Newburyport	Essex	3.96	10	3.20	—0.76	6.83	1881	0.96	1885
Somerset	Bristol	4.83	16	2.74	—2.09	9.43	1877	1.14	1885
Michigan.									
Kalamazoo	Kalamazoo	2.57	13	1.84	—0.73	7.33	1877	0.42	1883
Thornville	Lapeer	2.56	12	0.71	—1.85	4.67	1877	0.71	1889
Minnesota.									
Minneapolis	Hennepin	1.86	23	1.07	—0.79	9.00	1868	0.32	1883
Montana.									
Fort Shaw	Lewis&Clarke	0.46	18	0.34	—0.12	1.05	1883	0.04	1873

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of March.	(2) Length of record.	(3) Total for March, 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for March.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
New Hampshire.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Hanover	Grafton	2.32	50	2.65	+0.33	5.25	1888	0.25	1866
New Jersey.									
Moorestown	Burlington	3.48	26	3.85	+0.37	5.78	1876	1.08	1885
South Orange	Essex	3.69	17	3.88	+0.19	8.20	1888	0.81	1885
New York.									
Cooperstown	Otsego	2.88	35	1.76	−1.12	5.29	1871	0.55	1885
Palermo	Oswego	2.89	35	2.59	−0.30	7.00	1859	0.68	1885
North Carolina.									
Lenoir	Caldwell	4.22	17	1.40	−2.82	10.20	1875	0.50	1879
Ohio.									
N. Lewisburgh	Champaign	3.20	17	0.75	−2.45	5.90	1888	0.75	1889
Wauseon	Fulton	2.76	17	2.96	+0.20	6.52	1876	0.62	1885
Oregon.									
Albany	Linn	4.46	11	2.28	−2.18	11.71	1866	0.81	1885
Eola	Polk	4.94	20	2.84	−2.10	10.66	1879	0.55	1885
Pennsylvania.									
Dyberry	Wayne	2.98	22	1.74	−1.24	5.78	1871	1.03	1885
Grampian Hills	Clearfield	3.93	18	3.12	−0.81	6.89	1875	1.34	1885
Wellsborough	Tioga	5.28	9	3.19	−2.09	10.08	1884	0.66	1887
South Carolina.									
Statesburgh	Sumter	3.91	8	3.27	−0.64	5.90	1888	0.97	1887
Tennessee.									
Austin	Wilson	5.59	18	2.98	−2.61	12.59	1875	1.93	1861
Milan	Gibson	3.96	6	4.41	+0.45	5.28	1888	1.94	1885
Texas.									
Fort Concho	Tom Green	0.80	15	1.15	+0.35	3.16	1883	0.00	1887
New Ulm	Austin	4.92	16	4.13	−0.79	13.13	1885	1.27	1887
Vermont.									
Strafford	Orange	3.64	16	4.30	+0.66	7.10	1876	1.55	1878
Virginia.									
Bird's Nest	Northampton	4.83	20	7.20	+2.37	8.75	1884	1.70	1873
Wytheville	Wythe	3.61	24	1.37	−2.24	8.04	1884	1.37	1889
Wisconsin.									
Madison	Dane	2.70	21	1.48	−1.22	7.90	1869	0.32	1883
Washington.									
Fort Townsend	Jefferson	1.88	14	1.42	−0.46	4.32	1876	0.11	1884

Table of excessive precipitation, March, 1889.

State and station.	Monthly rainfall 10 inches or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
California.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Anderson	12.00					
Boulder Creek	19.58					
Calistoga	10.87					
Colegrove		2.59	13			
Colfax	13.90					
Delta	37.52					
Dunsmuir	21.39					
El Nerano	10.69					
Felton	13.48					
Georgetown	12.29	3.10	13			
Do		3.00	14			
Glen Allen	16.00					
Laurel	17.77					
Los Angeles		2.53	16			
Redding	10.78					
Sacramento				2.00	2 00	13
San Francisco		3.08	12–13			
Santa Barbara		2.90	13			
Tehama	10.41					
Delaware.						
Viola		5.01	3–5			
Florida.						
Fort Barrancas		4.00	1–2			
Key West		2.79	12–13			
Pensacola		3.02	2–3			
Georgia.						
Diamond		3.25	2			
Louisiana.						
Plaquemine		2.79	23			
Port Eads		2.50	3			
Maryland.						
Baltimore		2.71	3–4			
McDonogh		3.01	4			
Missouri.						
Macon		2.80	3			
Springfield		2.86	17–18			
New York.						
Friendship		3.00	2			
South Carolina.						
Charleston		3.14	13–14			
Trial		2.68	15			
Texas.						
Galveston				1.30	0 35	1
Howe		2.50	31			
Luling		3.04	27			
Virginia.						
Norfolk		2.50	14–15			
Smithfield		4.22	19–20			

The above table shows that monthly precipitation to equal or exceed ten inches was not reported, except in California, where this amount was exceeded at thirteen stations located in the west-central and north-central portions of the state, the greatest fall, 37.52 inches, being noted at Delta.

The greatest amount of precipitation reported in twenty-four hours was 5.01 inches, at Viola, Del. Of the twenty-four instances in which precipitation to equal or exceed 2.50 inches in twenty-four hours was reported, six were noted in California, three in Florida and Texas, two in Louisiana, Maryland, Missouri, South Carolina, and Virginia, and one in Delaware, Georgia, and New York.

The greatest amount of precipitation reported in one hour or less occurred at Galveston, Tex., on the 1st, when 1.30 of an inch fell in thirty-five minutes, giving a rate per hour of 2.23 inches. The only other instance of an excessive rainfall of short duration was reported at Sacramento, Cal., where 2.00 inches fell in two hours on the 13th.

EXCESSIVE RAINFALLS OF TEN MINUTES, OR LESS.

The following record of heavy rainfalls of ten minutes, or less duration, as recorded at the Meteorological Observatory, New York City, has been furnished by Mr. Rudolph Hering, Consulting Engineer, Department of Public Works, Office of Engineer in Charge of Sewers, New York City:

Date.	Maximum fall.	Time.	Date.	Maximum fall.	Time.
	Inch.	*Min.*		*Inch.*	*Min.*
July 27, 1880	0.50	10	August 5, 1884	0.45	5
May 22, 1881	1.15	10	June 5, 1885	0.30	3
June 15, 1882	0.35	10	November 18, 1886	0.25	2
June 29, 1882	0.50	10	August 18, 1887	0.43	5
September 21, 1882	0.45	8	July 19, 1888	0.39	10
June 6, 1883	0.44	5	August 4, 1888	0.59	10
July 12, 1884	0.40	10	August 21, 1888	0.40	10

In a letter to the Chief Signal Officer, forwarding the above record, Mr. Hering remarks as follows:

"As you request suggestions which bear upon the observations and data of the Signal Service, pertinent to engineering problems, I take the liberty of making the following one: A very important problem is the proper size for sewers in a densely built up city. They must be large enough to carry off the water from rains of great intensity, otherwise there will be flooding of cellars, causing sometimes great damage. My observations have led me to conclude that a ten-minute period would be the proper time in which to state the heaviest actual rainfall. Inside of such time it is supposed that the water has reached most of the sewers. To designate the maximum fall as formerly in inches per hour leads often to erroneous conclusions, and your late method of giving shorter periods has been very useful. Therefore the greatest usefulness of your valuable observations can be accomplished for the above purpose, which you readily see represents a considerable capital, by stating the heaviest falls in ten minutes, or less time. This is practicable where automatic gauges are used, and I am much pleased to see that you have put a number of them into use over the country. The inclosed data, showing maximum intensity of rain for short periods, is such as is necessary to consider in the construction of branch sewers."

SNOW.

Snow was reported on the greatest number of dates, twenty-one, in New York; on nineteen in Michigan and Ohio; on eighteen in Pennsylvania; on seventeen in Vermont; on sixteen in Minnesota; on from ten to fifteen, inclusive, in Colorado, Connecticut, Dakota, Maine, Massachusetts, New Hampshire, New Jersey, New Mexico, West Virginia, Wisconsin, and Wyoming; on from five to nine, inclusive, in Arizona, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Montana, Nebraska, Oregon, and Rhode Island; and on from one to four, inclusive, in California, District of Columbia, Indian Territory, Missouri, Nevada, Tennessee, Texas, Utah, Virginia, and

Delaware. It was noted in the greatest number of states and territories, twenty-eight, on the 9th; in twenty-six on the 8th; in nineteen on the 28th; in eighteen on the 29th; in seventeen on the 7th, 10th, and 20th; in sixteen on the 21st; in from ten to fifteen, inclusive, on the 6th, 15th, 27th, 30th, and 31st; in from five to nine, inclusive, on the 1st to 5th, 11th to 14th, 16th to 19th, 22d, 23d, and 26th. On the 24th and 25th no snow was reported.

The southern limit of snow is represented by a line traced from Norfolk, Va., westward to Wichita, Kans., and thence southward into Texas to about latitude N. 33°, whence it trends westward to south-central Arizona, from which locality it is continued northwestward into California east of Sacramento. To the northward of the fortieth parallel the line indicating the snow limit over the western part of the country curves southeastward over the plateau region of the Rocky Mountains forming an elongated area, within which no snow was reported, extending from Washington and the northeastern part of Oregon to western Colorado.

The heaviest snowfall for the month, east of the one hundred and twentieth meridian, was reported within an area extending from central Vermont westward into north-central New York, where it exceeded twenty-four inches, the greatest depth, thirty-six inches, being noted at Strafford, Vt. A monthly snowfall of twenty-four inches was also reported at Sault de Ste. Marie, Mich. At Summit, Cisco, and Emigrant Gap, Cal., a depth of 95.5, 94.0, and 29.0 inches, respectively, was reported. The snowfall exceeded twelve inches over the northern half of New Hampshire and Vermont; generally over New York, north of the forty-third parallel; within a limited area in east-central Pennsylvania, and at stations in extreme northern parts of Michigan.

DEPTH OF SNOW REMAINING ON GROUND ON 15TH AND AT CLOSE OF MONTH.

Except within two areas, one embracing a greater part of New York, Vermont, and New Hampshire, west-central and southeastern Maine, and the other extending over central Minnesota, and at a station in west-central Nevada, no snow was reported on the ground on the 15th. The greatest depth, twenty-four inches, was noted at Palermo, N. Y. In Minnesota the greatest depth was reported in the vicinity of Lake Winnibigoshish, where it varied from five to eight inches. At Wellington, Nev., a depth of five inches was noted.

Chart v shows that at the close of the month snow was reported on the ground over a greater part of New England, New York, eastern and central Pennsylvania, northern New Jersey, and the Lake region, and that the greatest depth was noted at stations in north-central New Hampshire and Vermont, and central New York, where twenty inches or more were reported. For the extreme northern part of the upper peninsula of Michigan a depth of twelve inches is indicated.

MONTHLY SNOWFALLS (inches and tenths) MARCH, 1889.

Below are given all monthly snowfalls of five inches, or more, and in states and territories where the maximum depth was below that amount, the station reporting the greatest is given: *Arizona.*—Williams, 5.5. *California.*—Summit, 95.5; Cisco, 94; Emigrant Gap, 29; Towles, 6. *Colorado.*—Fort Lewis, 9.5; Leadville, 9; Georgetown, 8.5; Idaho Springs, 7.3; Breckenridge and Grand Lake, 7; Coulter and Palmer Lake, 6. *Connecticut.*—New Hartford, 5.4; Mansfield, 5. *Dakota.*—Webster, 6.2; Fort Meade, 5.6. *Delaware.*—Newark, trace. *District of Columbia.*—Washington City, 0.5. *Illinois.*—Winnebago, 8.5; Lake Forest, 8; Belvidere, 7.5; Rockford, 7; Lanark, 6.8; Sycamore, 6.5; Riley, 6.2; Aurora, 5.7; Chicago, 5.1; Mount Morris and Rock Island Arsenal, 5. *Indiana.*—Angola, 2. *Indian Territory.*—Fort Sill, 0.4. *Iowa.*—Clinton, 4.5. *Kansas.*—Junction City, 3.8. *Kentucky.*—Mount Sterling, 2.5. *Maine.*—Mayfield, 14; Bar Harbor, 6; Portland, 5.4. *Maryland.*—Barren Creek Springs, 1.8. *Massachusetts.*—Williamstown, 11.3; Royalston, 6.2. *Michigan.*—Sault de Ste. Marie, 24; Calumet, 14; Pulaski, 9; Marquette, 8.4; Jeddo and Lansing, 8; Port Huron, 7.7; Berlin, 7.4; Hastings, 7.3; Atlantic, Flint, Hanover, Ovid, and Pontiac, 7; Saint John's and Thornville, 6.5; May and Traverse City, 6; Lothrop, 5.7; Ypsilanti and Fort Wayne, 5.2; Eden, Fremont, and Washington, 5. *Minnesota.*—Pokegama Falls, 9.2; Farmington, 6; Duluth, 5.9; Lake Winnibigoshish, 5.8; Leech Lake, 5.7. *Missouri.*—Sedalia, 4. *Montana.*—Fort Maginnis *a* and Sheldon, 8; Fort Maginnis *b*, 7.2; Fort Assinaboine, 6.1; Virginia City, 6; Helena, 5. *Nebraska.*—Hay Springs, 3.7. *Nevada.*—Wellington, 12; Pioche and Tuscarora, 6.5. *New Hampshire.*—Berlin Mills, 16.5; North Sutton, 9; Nashua, 7.5; North Chesterfield, 7; Manchester, 6.4; Antrim, 6. *New Jersey.*—Atlantic City, 7.3. *New Mexico.*—Santa Fé, 5.6. *New York.*—Saranac Lake, 26; Number Four, 24; Palermo, 23; Hess Road Station, 22.4; Lyons, 20; Utica, 17.7; Rochester, 17.5; Barnes' Corners, 16; Potsdam, 15.5; Oswego, 14.4; Somerset, 13.5; Fort Porter, 13.2; Ilion, 12.6; Constableville, 12; New York City, 11; Salem, 10,8; Lowville, 10.5; Fort Wadsworth, 10.2; Le Roy, 9.1; Fort Niagara and Ithaca, 9; Buffalo, 8.9; North Hammond, 8.7; Canton, 8.6; Friendship and Humphrey, 8.5; David's Island, 8.3; Fort Schuyler and Nineveh, 8; Angelica, 7; Perry City and Tannersville, 6.5; Cooperstown, 5.8; Queensbury and Wedgewood, 5.2; Geneva and South Canisteo, 5. *Ohio.*—Cleveland, 6.1. *Oregon.*—Siskiyou, 5. *Pennsylvania.*—Blooming Grove, 13; Charlesville, 11.5; Eagle's Mere, 9.6; Pleasant Mount, 9.5; Germantown and Girardville, 8; Somerset, 7.8; Uniontown, 7.5; Drifton, 7.2; Grampian Hills, 7; Salem Corners, 6.3; Allegheny Arsenal and Le Roy, 6.1; Rimersburgh, 6; Dyberry, 5.5. *Rhode Island.*—Woonsocket, 6. *Texas.*—Fort Elliott, 3.9. *Utah.*—Fort Douglas, 2. *Vermont.*—Strafford, 36; East Berkshire, 25.9; Lunenburgh and Burlington, 17.5; Northfield, 14; Saint Johnsbury, 7. *Virginia.*—Bolar, 1. *West Virginia.*—Middlebrook, 22.5; Hartmontsville, 9; Rockport, 7. *Wisconsin.*—Summit Lake, 8.5; Delavan, 8.2; Fond du Lac, 6; Manitowoc, 5.2. *Wyoming.*—Camp Sheridan, 1.8.

HAIL.

Descriptions of the more severe hail-storms of the month are given under "Local storms." Hail was reported during the month as follows:

4th, Pa. 7th, Ind., Iowa, N. H. 8th, Cal., Nev., Ohio, Oregon. 9th, Wash. 10th, Ariz. 13th, Cal., N. H., Oregon. 14th, Ariz., Cal. 15th, Ariz., Ark., Cal., Iowa, Mo., N. J., N. Y. 16th, Cal., La., Tenn. 17th, Conn., Iowa, Mass., N. H., Ohio. 18th, Ill., Ky., Mo., N. H., N. Y., Oregon, Tenn. 19th, Ky., N. C., S. C., Tenn. 20th, Ind. T., Mass., Oregon, R. I. 21st, Ariz., Mass., N. Y., R. I., Tex. 22d, Colo., Tex. 23d, Oregon. 24th, Ga., Miss., S. C. 25th, Minn. 26th, S. C. 27th, N. Y., Tex. 28th, Iowa, Md., Mass., N. H., N. J. 30th, Dak., Ill., Iowa, Kans., Mass., Mich., Mo. 31st, Ill., Iowa, Md., Mass., Mo., N. J., N. Y., Ohio, Pa., Tex.

SLEET.

Sleet was reported during March as follows: 1st, Ind., Ohio, Minn. 2d, Miss., Ohio. 4th, Mass. 5th, Ill., Iowa, Ohio, W. Va. 7th, Iowa, Ohio. 8th, Ind. 9th, Kans. 10th, Tex. 14th, Dak., Mich., Minn., Nebr. 15th, Dak., Iowa, Mich., Minn., Nebr., Nev. 16th, Conn., Minn. 17th, Me., Mass., Vt. 19th, Utah. 20th, Conn., N. Y. 21st, Conn., N. Y., Ohio, R. I. 26th, Wis. 27th, Ky. 28th, Conn. 29th, Mich., N. Y., Ohio. 30th, Dak., Ill., Iowa, Mich., Minn. 31st, Conn., Dak., Ind., Mass., Mich., N. J., N. Y., Ohio, Pa.

WINDS.

The prevailing winds during March, 1889, are shown on chart i by arrows flying with the wind. In New England, the south Atlantic states, Florida, the upper Mississippi valley, and the northeastern, middle, and southeastern slopes of the

Rocky Mountains north to west winds were most frequently noted. In the middle Atlantic and east Gulf states, the lower Mississippi, Ohio, and Missouri valleys, Tennessee, and the lower lake region they were mostly from the northwest. In the west Gulf states and on the north Pacific coast variable; in the upper lake region, northerly, and in the plateau regions of the Rocky Mountains, and on the immediate Pacific coast south of the fortieth parallel, from southwest to northwest.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, have been reported as follows: Block Island, R. I., 57, ne., 5th; 52, ne., 15th; 60, ne., 17th; 60, ne., 20th; 62, ne., 21st. Hatteras, N. C., 53, n., 15th; 52, n., 28th. Fort Canby, Wash., 50, s., 18th. Tatoosh Island, Wash., 50, e., 7th.

LOCAL STORMS.

The following description of storms generally refer to disturbances which attended the passage of areas of low pressure traced on chart i:

13th. *Michigan.*—Sault de Ste. Marie: high northwesterly wind began 4.15 a. m.; it attained the velocity of a gale at 7.40 a. m. and continued twelve hours; maximum velocity, thirty-four miles per hour from the northwest; signs were blown down and telegraph and telephone wires were damaged by the wind.

14th. *Georgia.*—Savannah: light rain fell all day. The wind blew at the rate of about thirty-six miles per hour from the northwest most of the afternoon, and attained a maximum velocity of forty-six miles per hour, blowing down limbs of trees, chimneys, signs, etc.

14th and 15th. *Virginia.*—Cape Henry: a gale from the northeast began 12.35 p. m., 14th; it increased steadily in force from 2 p. m. through the night and following day, attaining a maximum velocity of seventy-two miles per hour from the northeast on the 15th. The brigantine "Agnes Barton" was blown ashore and wrecked during the storm.

15-16th. *Virginia.*—Norfolk: a severe storm prevailed. The wind attained its maximum velocity, thirty-five miles per hour, at 12.30 a. m., 15th. A large number of vessels were wrecked or otherwise damaged and several persons were drowned during the gale.

18th. *Tennessee.*—Dayton: this city was visited in the evening by the heaviest rain and thunder-storm ever known here. The waters of Richland Creek, which runs through the city were so swollen that the fires in the furnaces were put out. A mile and a half of railroad was washed out and great damage done to other property. The loss in this vicinity is estimated at $16,000—*The Daily American, Nashville, Tenn., March 20th.* Chattanooga: a thunder-storm began 6.33 p. m. and ended 11.55 p. m.; heavy rain falling for about two hours and light rain continuing until after midnight. The sewers being inadequate to carry off the water, some streets in the city were flooded. Hail occurred for five minutes during the storm, the stones being as large as a medium-sized marble, breaking a number of skylights and window panes.

19th. *North Carolina.*—Wilmington: the hail and thunder-storm in the evening was very severe in the northern section of the city. At the Wilmington Compress building nearly all the glass in the skylights was broken, and the hail drifted in places to a depth of twelve inches; the hail also caused much damage to plants and shrubbery. Beyond the city limits north and west the storm was still more severe. At Navassa Guano Works one hundred and fifty panes of glass were broken and the drifts were three feet deep.—*The Morning Star, Wilmington, March 21st.*

21st. *Texas.*—Fort Clark: a terrific hail storm with lightning and high wind passed over this place from the north at 10 p. m; stones the size of pigeon eggs, and some larger, fell. An enormous quantity of fish, estimated at several wagon loads, were found dead on the banks of Las Moras Creek after the storm. The crops in the company gardens were destroyed.—*Report of United States Army post surgeon.*

30th. *Iowa.*—Davenport: a severe thunder-storm, accompanied by sharp lightning, hail, heavy rain, and high southeast wind, with a maximum velocity of thirty-two miles per hour, occurred in the afternoon; the wires of the electric light company were shattered by lightning and the light extinguished; the storm also caused a delay of several hours to the electric cars in this city. A furniture factory was struck by lightning and the building set on fire; loss $20,000.

31st. *Kentucky.*—Lexington: light rain fell at intervals during the day and a severe gale from the southwest began 11 a. m., attaining a maximum velocity of sixty-two miles per hour, which is the highest wind velocity recorded here since the establishment of the Signal Service station in 1887. *Texas.*—Hico, Hamilton Co: a storm about twenty feet in width, and moving in a northeasterly direction, passed about one mile west of this town between 2 p. m. and 3 p. m. One house in its path was twisted and hurled about, and a rock chimney standing between two rooms fell, killing two children and injuring others. After passing this point the storm disappeared. It is reported that a cloud-burst occurred about two miles northwest of this place a few minutes after the storm had passed, and that about twelve inches of rain fell in a few minutes.—*Reported by Mr. J. C. Rodgers.*

INLAND NAVIGATION.

ICE IN RIVERS AND HARBORS.

Connecticut River.—New London, Conn.: the river was open to navigation on the 6th; it has been one of the shortest ice seasons in the history of the river.—*New London Telegraph, March 6th.*

Hudson River.—Albany, N. Y.: the first boat of the season, from New York City, arrived here on the 21st.

Oswego River.—Oswego, N. Y.: the ice passed out of river very rapidly on the 17th and 18th, and the river and harbor were free of ice on the 19th, but filled up on the following day; it passed out again on the 24th.

Niagara River.—Buffalo, N. Y.: floating ice in river 11th, 13th, 23d, 25th, 28th, and floating ice in harbor, 22d, 23d, 25th.

Maumee River.—Toledo, Ohio: the ice in river broke and passed out into the lake on the 12th; the river was nearly free of ice the following day, and open to navigation on the 17th.

Beaver Creek.—Pittsburgh, Pa., 5th: the new bridge across the creek at Fallston, about one mile above Rochester, Pa., is in danger of being carried away by an immense gorge of ice. The ice has formed a regular dam at the bridge, and every hour tons are being added to the weight.—*New London Telegraph, March 6th.*

Black River.—Port Huron, Mich.: the river was free of ice on the 16th.

Pine River.—Saint Clair, Mich.: the ferryboat "Clara" began her regular trips on the 6th, after having been laid up one month.—*Saint Clair Republican, March 7th.*

Thunder River.—Alpena, Mich.: the river and bay were clear of ice on the 19th.

Saginaw River.—The ice was moving out of the river on the 14th. A narrow bridge of thin ice at the foot of Lake Huron was all the ice perceptible from Fort Gratiot, clear water appearing as far as the eye could reach.—*Buffalo Courier, March 16th.*

Grand River.—Grand Haven, Mich.: the river was almost clear of ice on the 5th, and vessels can now enter and leave the port without difficulty.

Saint Clair River—Detroit, Mich.: the steamer "R. G. Stew-

art" left here on a trial trip up the river on the 21st, and the steamer "City of Cleveland" cleared for Cleveland, Ohio, on the same day; navigation was fully resumed on the 30th, when the boats began their regular trips. Port Huron, Mich.: the river was clear of ice as far as Algona, Saint Clair Co., Mich., on the 9th; the steamer "Mary," after having been laid up since February 6th, resumed her regular trips between this point and Marine City, Mich., this day. The high wind of the 19th drove a large quantity of ice from Lake Huron up into the river, the ferry-boats with difficulty forcing a passage through the ice at times; the river was also full of floating ice on the 20th and 25th.

Allegheny River.—Pittsburgh, Pa.: floating ice in river 3d to 11th.

Mississippi River.—Davenport, Iowa, 14th: the ferry boat is making regular trips. The steamer "Pilot" came down the river from Princeton, Iowa, this morning, and the steamer "Dick Clyde" left to-day with seven barges for Keokuk, Iowa. Saint Paul, Minn.: the ice dam in river from Robert street bridge down ran out during the afternoon of the 20th; no damage caused. Keokuk: the ice dam in river broke on the 2d. The Warsaw packet "Patience" resumed her regular trips on the 9th, opening navigation. La Crosse, Wis.: the ice moved out in the river, opposite this city, at noon on the 15th. The steamer "Pittsburgh," from Dubuque, Iowa, bound for Winona, Minn., arrived here at 9 a. m. 30th; this was the first arrival of the season. Dubuque, Iowa: the ice in river began to break up on the 11th, and the river was clear of ice at this point on the 12th. Floating ice in river 13th, 14th, and river open to navigation on the 16th.

Missouri River.—Fort Yates, Dak.: floating ice in river 15th and 22d. Fort Buford, Dak.: the ice in river moved out freely from the 21st to the 25th; the river was clear of ice on the 26th. Bismarck, Dak.: the ice in river broke up at 10 a. m. 21st, and run out. Leavenworth, Kans.: the gorge which formed in the river during the night of February 28th and March 1st moved out during the night of the 2d–3d; floating ice in river 3d, 4th. Omaha, Nebr.: the river, which has remained frozen since January 18th, broke the afternoon of the 4th; floating ice in river 5th to 8th. Owing to the low stage of water no damage was done by the moving ice. Kansas City, Mo.: floating ice in river on the 3d and 4th.

Lake Ontario.—Rochester, N. Y.: the lake was clear of ice, as far as the eye could reach, on the 5th.

Lake Erie.—Cleveland, Ohio: the steamer "City of Cleveland" arrived at this port from Detroit, Mich., at 4.30 p. m., 21st; she reports that no obstruction of ice was encountered during her passage.

Sandusky Bay.—Sandusky, Ohio: the bay was clear of ice on the 13th, and navigation on Lake Erie opened for the season.

Presque Isle Bay.—Erie, Pa.: an open space of water was observed to extend out into Lake Erie, as far as the eye could reach, on the 12th.

Black Lake.—Holland, Ottawa Co., Mich, 19th: the ice in the lake was all driven out last night, and navigation is open here two weeks earlier than last year.—*Detroit Free Press, 20th.*

Macinac Straits.—Sheboygan, Wis., 18th: the ice in the north passage is reported broken up to within less than a mile from Macinac Island docks, and boats can now reach the island from Detroit. The ice in this passage is broken up to within three miles of Dummy Light.—*Detroit Free Press, March 19th.*

Lake Michigan.—Milwaukee, Wis., 28th: the harbors on the lake are reported free of ice. A sailing vessel arrived at this port from Kewaunee, Wis., yesterday, being the first sail arrival of the season. The Milwaukee River at this place is entirely free of ice.

Lake Superior.—Duluth, Minn.: the fishing tug "Eviston" left for the south shore on the morning of the 17th and returned in the evening, same day; she found but little difficulty in getting through the ice, which extends about one mile out from the shore in a broken condition. Propeller "Ossifrage" cleared for Grand Marais, Minn., at noon, 25th, and returned the following day; the captain reports the lake clear of ice as far as can be seen beyond that point.

STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various stations; the highest and lowest depths for March, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, March, 1889 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La	29.9	19	24.0	5,6	19.9	4.1
Arkansas River:						
Fort Smith, Ark	22.0	26	20.0	22	4.8	15.2
Little Rock, Ark	23.0	28	21.5	1	7.2	14.3
Missouri River:						
Leavenw'rth, Kans.	20.0	2	12.8	4	5.4	7.4
Kansas City, Mo	21.0	30	9.7	1	5.8	3.9
Mississippi River:						
Saint Paul, Minn	14.5	24, 25	4.2	22, 31	3.5	0.7
La Crosse, Wis *	24.0	16	6.0	19	4.7	1.3
Dubuque, Iowa †	16.0	31	7.3	15, 17	6.0	1.3
Davenport, Iowa	15.0	13	6.0	16, 18, 19	4.5	1.5
Keokuk, Iowa	14.0	1	9.7	6	3.0	6.7
Saint Louis, Mo	32.0	5-6	16.4	1	5.3	11.1
Cairo, Ill	40.0	1	31.4	21	20.8	10.6
Memphis, Tenn	34.0	2	26.3	24	16.4	9.9
Vicksburg, Miss	41.0	11, 12	33.0	28	25.5	8.1
New Orleans, La	13.0	18	12.7	1	9.2	3.5
Ohio River:						
Pittsburgh, Pa	22.0	6	13.8	1	3.6	10.2
Parkersburg, W.Va.	38.0	8	17.9	1	6.5	11.4
Cincinnati, Ohio	50.0	10	28.0	3, 18	16.0	12.0
Louisville, Ky	25.0	11	10.6	19	7.4	3.2
Cumberland River:						
Nashville, Tenn	40.0	23	21.6	18, 19	6.3	15.3
Tennessee River:						
Knoxville, Tenn	29.0	5	3.3	31	1.9	1.4
Chattanooga, Tenn	33.0	22	9.5	17	3.2	6.3
Monongahela River:						
Pittsburgh, Pa	29.0	6	13.8	1	3.6	10.2
Savannah River:						
Augusta, Ga	32.0	4	21.0	24, 31	9.9	11.1
Willamette River:						
Portland, Oregon	15.0	16	4.8	6, 7, 8, 9	0.8	4.0

* For 16 days. † For 15 days.

FLOODS.

San Antonio, Tex.: the unusually heavy rain which fell during the morning of the 1st caused some damage to buildings, sidewalks, and culverts in this city; much damage occurred along the banks of the San Antonio River; numerous small bridges, bath houses, fences, etc., were swept away by the rapid rise of the water.

Harrisburg, Pa., 4th; the incessant rain which has been falling since the early morning of the 2d has caused a rise in all streams emptying into the Susquehanna River. The Paxton Creek is overflowing its banks and inundating the low grounds along its course.

Philadelphia, Pa., 5th: the waters of the Delaware and Schuylkill rivers and Wissahickon Creek are much swollen in consequence of the heavy rain storm which began on the evening of the second. At Manayunk the Schuylkill rose fourteen feet above its level and a number of manufactories were compelled to suspend operation. Chambersburgh, Pa., 5th: the rain has swollen the streams running through here to a dangerous height. The lowlands on the eastern side of the town are all under water. The track of the Western Maryland Railroad between Chambersburgh and Waynesborough is under water for several miles and all trains are delayed.—*New London Telegraph, March 6th.*

Eureka, Humboldt Co., Cal., 14th: the high stage of water in Eel River is causing the banks to be overflowed, doing considerable damage to property in this section.

Los Angeles, Cal., 17th: the heavy rains of the last few days have caused several washouts on the railroads in this section, and all traffic was generally suspended on the 16th. The Los Angeles River did not overflow but is running full, damaging the levee, washing away several timbers in the Downey avenue bridge in this city, and injuring the approaches of the other bridges; many of the streets were badly washed and a great number of cellars flooded.

HIGH TIDES.

Atlantic City, N. J., 16th: it has been many years since the tide has been as high here as to-day. The storm which has prevailed on the coast caused the high water, and for a few hours Atlantic City was cut off westward by the flooding of the railroad tracks which cross the meadows. The water on the Camden and Atlantic Railroad this morning was so high that the fires in the railroad engines were extinguished. This afternoon the Five-Mile Beach branch railroad is under water and the Sea Isle City and Ocean City branch is flooded. No trains are running beyond Sea Isle City. Cape May, 16th: the tide is the highest known for years; much damage has been done here.—*Buffalo Express, March 17th.*

Long Branch, N. J., 16th: the severe storm and high tides which have prevailed along the coast for the past twenty-four hours have caused a great amount of damage. The tide in the Shrewsbury River ran higher than in many years. Sea Bright, N. J., 16th: at high tide to-night the heavy sea broke over the beach and is now sweeping through the hollow almost in the center of the town. The piles of lumber from bulkheads have been carried to Ocean avenue, striking the fishermen's huts in the hollow and demolishing them. The water in some streets is three feet deep and running with great force.—*Baltimore Sun, March 17th.*

Asbury Park, N. J., 17th: the high tides of last night and this morning were very destructive along this part of the coast; the great board walk here was severly damaged, and the bluff was washed out in several places. At Elberon several bulkheads were washed out. Point Pleasant, March 17th: at Bay Head bulkheads were washed away. In many places the surf ran over the beaches and did much damage. The railroad tracks from Absecom to Atlantic City were under water, and no train could cross at high tide. All the lowlands are overflowed. The railroad from Atlantic City to Egg Harbor Inlet is broken up and trains cannot run. The railroad from Ocean City to the mainland was under water, as was the railroad from Sea Isle to Avelon.—*The New York Sun, March 18th.*

Norfolk, Va.: an unusually high tide occurred on the 15th and 20th, flooding the lower portions of the city; during the first named date all street car travel was interrupted during the day by the high water. Atlantic City, N. J.: an unprecedented high tide occurred here on the 20th; it was very destructive to the board walk, bath-houses, pavilions, and even many of the larger houses. Building after building was quickly undermined by the rushing water and tumbled down into the sea. All along the beach is strewn debris.—*The York World, March 22d.*

New York City: it is reported that the tide at Coney Island on the morning of the 21st was the highest of the season; the whole distance in and about the bulkhead is a wreck, which $100,000 will not make good.—*The New York World, March 22d.* A big tide prevailed on the 21st in the lower part of Elizabeth, N. J., and several of the lower stories of houses near the meadows were flooded. Communication with the factories along Staten Island Sound was completely cut off at high water. The tracks of the Newark and Elizabeth branch of the Central Railroad were flooded in places to the depth of nearly five inches, as also were the tracks of the Long Branch Railroad. The tide at South Beach, Staten Island, was the highest seen in many years and did considerable damage. The sea at 11 a. m. broke over the embankments and flooded the swamp for several miles.—*New York Daily Tribune, March 22d.*

High tides also occurred as follows: Eastport, Me., 21st; Wood's Holl, Mass., 16th; Cape Henry, Va., 14th, 15th, 19th, 20th.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were noted on the 5th at stations in Michigan, Illinois, Iowa, Minnesota, Dakota, and Montana; on the 28th in northern Ohio, western New York, Minnesota, and Dakota, and on the 27th in southwestern Michigan, northern Illinois, and eastern Minnesota. No auroras were reported at stations south of the fortieth parallel or east of the seventy-seventh meridian. The following are descriptions of the more notable displays observed:

Bismarck, Dak.: an auroral arch of pale yellow color, with a dark segment beneath, and extending from azimuth 135° to 225° and to altitude 30°, was first observed 9.15 p. m., 5th. Its maximum intensity occurred at 11.30 p. m., and the display ended during the night.

Moorhead, Minn.: an aurora was observed 10.30 p. m., 5th. It consisted of a steady white arch which extended from azimuth 160° to 235°, and rose to altitude 30°. The display continued as described until daylight of the 6th. Another auroral display, consisting of a pale white arch, was observed from 3.30 a. m. until daylight on the 28th.

Fort Buford, Dak.: an auroral display was observed 10.18 p. m., 5th. It consisted of a faint yellowish light in the form of an arch which rose gradually until it attained altitude 40°, at 11.05 p. m. No change in color or brilliancy occurred during its rise, but a second partial arch formed which was only slightly visible at some points; it had an altitude of about 30°. The aurora had entirely disappeared at 1.50 a. m., 6th.

Duluth, Minn.: an aurora was first observed 9.15 p. m., 5th, consisting of an irregular whitish light extending from azimuth 170° to 210° and to altitude about 30°. At 9.50 p. m. it changed to a pale yellow arch, from which occasional streamers moved from east to west, and occupied the same position in azimuth and altitude 10°, beneath which the dark segment was well defined. The sky became obscured 11.15 p. m. Another auroral display was observed 10.15 p. m., 27th, consisting of a pale light extending over the northern sky from about azimuth 180° to 220°, and rising to altitude 20°. At 11.30 p. m. it assumed a pale yellow tint, and rested upon an irregular arch, from which bright streamers rose to altitude 45°. The display continued until after midnight but no new features were observed.

Saint Vincent, Minn.: an auroral light was observed 9.15 p. m., 6th, and ended during the night. It consisted of a confused mass of whitish light, at times developing into a more or less distinct arch, which covered 130° of the horizon, and reached altitude 15°. Its maximum brilliancy occurred 12.30 a. m., 7th, at which time several "needles" appeared rising from the arch to altitude 40°.

Fort Buford, Dak.: an aurora was first observed 12.22 a. m., 28th. It consisted of an arch of whitish color which extended over 90° of the horizon between northwest and northeast, and rising gradually to altitude about 40°, when it became stationary, and slightly increased in brilliancy. A second arch formed about the time the first one reached its maximum intensity; this arch rose to altitude 60°, and its most brilliant part was the centre. The display ended 2.45 p. m.

Auroras were observed during the month as follows: 1st, Bismarck, Dak.; Gillett, Iowa. 2d, Dunkerton, Iowa. 3d, Saint Vincent, Minn. 5th, Bismarck, Fort Buford, Fort Sully, Kimball, Webster, Wolsey, and Woonsocket, Dak.; Cedarville, and Riley, Ill.; Ames, Amana, Cresco, Dysart, Gillett, Independence, Monticello, and Osage, Iowa; Pontiac and Traverse City, Mich.; Duluth and Moorhead, Minn.; Fort Assinaboine, Mont.; Embarrass, Wis. 6th, Saint Vincent, Minn.; Fort Assinaboine, Mont. 14th, Hess Road Station, Mich. 19th, Fort Sully, Dak.; Saint Vincent, Minn. 21st, Milwaukee, Wis. 24th, Saint Vincent, Minn. 27th, Mount Morris, Ill.; Berrien Springs, Mich.; Duluth, Minn. 28th,

Fort Buford and Leech Farm, Dak.; Moorhead and Saint Vincent, Minn.; South Canisteo, N. Y.; Garrettsville, Ohio.

THUNDER-STORMS.

Thunder-storms were noted in the greatest number of states and territories (13) on the 18th, 27th, 30th, and 31st; in nine on the 15th, 16th, and 19th; in eight on the 14th and 24th; in seven on the 17th and 28th; in five, or less, on the 1st, 5th, 8th to 13th, 20th to 23d, 25th, 26th, and 29th. On the 2d, 3d, 4th, 6th, and 7th no thunder-storms were reported.

Thunder-storms occurred on the greatest number of days (12) in Tennessee; in California on eleven; in Kansas on ten; in Ariz., Ark., Fla., Ind. T., La., Miss., N. C., S. C., and Tex. on five to nine, inclusive; in Ala., Col., Conn., Ga., Idaho, Ill., Ind., Iowa, Ky., Me., Md., Mass., Mich., Mo., Mont., Nebr., N. H., N. J., N. M., N. Y., Ohio, Oregon, Pa., Utah, Va., and Wis. on less than five; in Dak., D. C., Minn., Nev., R. I., Wash., W. Va., and Wyo. none were reported.

MISCELLANEOUS PHENOMENA.

PRAIRIE FIRES.

Poplar River, Mont.: large prairie fires were burning on the plains north of this place on the 4th and 21st.

Yankton, Dak.: large prairie fires were observed in the east and south on the 7th and 28th. Prairie fires, very destructive to farm property, occurred two miles west of this city on 28th.

Fort Sully, Dak.: prairie fires were burning south of station on the 18th, and all around the station on the 19th, 25th, and 27th. Prairie fires were also observed from the 28th to 31st.

Bismarck, Dak.: extensive prairie fires were raging south of this city, on the west side of the Missouri, on the 25th and 26th; on the latter date slight fires were observed to northward.

Fort Yates, Dak.: prairie fires were observed to the north and west of this place at 1.20 p. m., 26th.

Huron, Dak.: prairie fires, which were driven by the high wind on the 28th, were very destructive in this section; many barns, houses, and hay-stacks were destroyed.

Prairie fires were also reported as follows: Fort Reno, Ind. T., 27th; Fort Sill, Ind. T., 2d to 8th, 10th to 15th, 17th to 20th, 26th to 31st.

HALOS.

Solar halos were most frequently reported in New York and California, where they were noted on sixteen days. In Michigan they were reported on fourteen days; in Oregon on thirteen; in Massachusetts and Tennessee on eleven; and in Illinois and Ohio on ten days. None were reported in Arkansas, Indian Territory, Nevada, New Mexico, Rhode Island, West Virginia, and Wyoming. They were noted in the greatest number of states and territories, fourteen, on the 23d and 27th; in thirteen on the 14th, 15th, and 22d; in eleven on the 11th; and in ten on the 2d, 13th, 21st, 24th, and 30th. There were no days for which solar halos were not reported in one or more states or territories.

Lunar halos were most frequently reported in Michigan, where they were noted on thirteen dates. In South Carolina they were reported on eleven, and in Tennessee on ten dates. In Utah no lunar halos were reported. They were reported in the greatest number of states and territories, twenty-four, on the 10th and 14th; in twenty-one on the 11th; in seventeen on the 13th and 15th; in thirteen on the 7th, 8th, 12th, and 16th, and in ten on the 9th. On the 1st, 3d, 20th, 25th, 27th, 28th, and 29th no lunar halos were reported

Leavenworth, Kans.—A lunar halo of 22° radius was observed forming at about 8.30 p. m., 13th. It was very distinct and perfectly formed, and the prismatic colors were clearly defined from 10 to 11 p. m. The halo lasted in perfect form for over four hours. As it began to disappear the colors first began to grow dim and indistinct; the diameters commenced to slowly contract, and the halo became smaller.

METEORS.

The distribution of meteors, by dates, was as follows: 1st, Hay Springs, Nebr. 4th, Riddleton, Tenn. 5th, Oregon, Mo. 6th, Fort Sully, Dak. 9th, Lead Hill, Ark.; Statesburgh, S. C. 20th, Riddleton, Tenn. 22d, Cedar Springs, S. C. 25th, Amherst, Leominster, and Newburyport, Mass.; Fremont, Mich. 26th Cedar Springs, S. C. 27th, Mesquite, Tex. 28th, Lead Hill, Ark.; Cleburne, Tex. 29th, Mantanzas, Fla.; Oregon, Mo.; Wauseon, Ohio; Queensbury, N. Y. 30th, Wedgewood, N. Y. 31st, The Dalles, East Portland, and Portland, Oregon.

The following are descriptions of the more notable meteoric displays reported:

Newburyport, Mass.: a brilliant meteor was observed on the 25th, at 7.26 p. m. It fell from northwest of the zenith toward the northern horizon, and when about ten degrees above the horizon was seen to burst. The sound of the explosion was plainly heard about forty seconds later. It was brilliant enough to cast a plainly visible shadow.—*Report of F. V. Pike, voluntary observer.*

Portland, Oregon: at 9.08 p. m., 31st, local time, a brilliant meteor, about one-fourth the apparent size of the moon, was observed in the northeastern sky at an altitude of about 20°. It traveled in a northwesterly direction, passed through the dipper, and was last seen about 10° above the northwestern horizon, when it burst, leaving two clouds, seemingly of a light film of smoke, which gradually disappeared. Three minutes after a sound was heard, resembling the explosion of a rocket. A large number of shooting stars were seen immediately before and after its passage. The meteor was of an electric hue tinged with bluish purple toward the forward point, and the light was so intense that the shadow of trees and houses were clearly defined. From various sources it is learned that this meteor was observed for hundreds of miles around Portland. Its brilliancy and size were especially marked at all places.—*Report of Signal Service observer.*

The Dalles, Wasco Co., Oregon: a very large and brilliant meteor was observed at 9 p. m., 31st. It was first seen about 30° from the zenith, moving slowly in a direction about north 30° west. The stars were visible in the zenith, but clouds were more and more dense toward the horizon, and when the meteor entered the clouded part it grew redder as it descended, and like the sun at certain seasons, resembled a large red ball. The meteor remained visible until within 6° or 8° of the horizon, but possibly was only shut out from sight by passing behind the mountains. During its course a small part seemed to become separated from the rest but followed in a path parallel with the large body until lost to sight. The time of flight was about four or five seconds. It cast a plainly visible shadow until obscured by clouds.—*Report of Prof. D. Torbet.*

MIRAGE.

Mirage were reported as follows: Webster, Dak., 9th, 22d, 27th, 29th; Woonsocket, Dak., 10th; Hampton, Iowa, 5th. San Diego, Cal.: a mirage was observed in the southwest at 5 p. m., 25th; houses, trees, and other objects seemed to be setting on a vast lake, and a steamship appeared in an inverted position. The mirage was visible for nearly one hour.

SAND STORMS.

Keeler, Cal.: the high northwest wind which began 11.15 a. m., 20th, attained a maximum velocity of forty-five miles per hour at 11.45 a. m., raising blinding clouds of sand which made it almost impossible to venture out of doors without covering the face. A sand storm also occurred at this place on the 12th, and at San Carlos, Ariz., from the 1st to 4th.

POLLEN.

Sergeant F. H. Clarke, Signal Corps, Vicksburg, Miss., for-

warded to the Chief Signal Officer a small quantity of yellow dust which fell during a rain at that place on the 23d. A sample of the dust was sent to the Department of Agriculture, and the following letter referring thereto has been received:

U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., *April* 1, 1889.

Gen. A. W. GREELY, *Chief Signal Officer:*

DEAR SIR.—Your letter of the 29th ult., containing sample of yellow dust, said to have fallen at Vicksburg, Miss., with the rain of the 23d ult., has been duly received and referred to the botanist for investigation, who reports that the powder is pollen, of a species of pine, probably that of the southern pine, of which extensive forests occur in the Gulf region. Showers of this pollen frequently fall in this city and farther north, being wafted from the pine forests by heavy storms occurring when the pine trees are in blossom, and precipitated by the rain.

Very respectfully,

(Sig.) J. M. RUSK, *Secretary.*

The MONTHLY WEATHER REVIEW for March, 1879, gives reports of pollen noted during that month at South Bethlehem, Pa., New Orleans, La., and Lynchburgh, Va.

SUN SPOTS.

Mr. John W. James, Riley, McHenry Co., Ill.: none seen until the 6th, then one, two days from east edge of disc, passing sun's meridian 10th and disappearing by the solar rotation 16th. Another broke out east of it 15th, disappearing on west edge 17th; none seen after. Mr. H. W. Gowey, North Lewisburgh, Champaign Co., Ohio: sun spots were observed on the 8th, and from the 11th to the 16th, inclusive.

Haverford College Observatory, Pa. (observed by Mr. H. V. Gummere):

Date. March, 1889.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Facuæ.		Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Facuæ.	
1, 11 a. m ...	0	0	0	0	0	0	1	12	1	1	Definition poor.
6, 11 a. m ...	1	2	0	0	0	0	1	2	3	8	Definition good.
7, 11 a. m ...	0	2	0	0	0	0	1	4	1	2	Definition good.
8, 10 a. m ...	0	3	0	0	0	0	1	7	1	1	Definition very good.
9, 11 a. m ...	1	1	0	0	0	0	1	1	0	0	Definition very poor.
11, 11 a. m ...	0	0	0	0	0	0	2	7	2	2	Definition fair.
12, 11 a. m ...	0	0	0	0	0	0	2	6	1	4	Definition fair.
13, 11 a. m ...	1	1	0	0	1	2	2	17	0	0	Definition very good.
14, 11 a. m ...	0	0	0	0	0	0	2	5	0	0	Definition very poor.
18, 4 p. m	0	0	0	0	2	5	0	0	0	0	Definition poor.
22, 11 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition poor.
23, 11 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition good.
26, 11 a. m ...	0	0	0	0	0	0	0	0	0	0	Definition poor.
27, 3 p. m	0	0	0	0	0	0	0	0	3	8	Definition very good.
29, 11 a. m ...	0	0	0	0	0	0	0	0	1	2	Definition fair.
30, 9 a. m	0	0	0	0	0	0	0	0	0	0	Definition poor.

VERIFICATIONS.

INDICATIONS FOR 24 HOURS IN ADVANCE.

The percentages of verifications of the 8 p. m. daily indications for February, 1889, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for districts east of the Rocky Mountains for February, 1889, were made by 1st Lieutenant Richard E. Thompson, 6th Infantry, Acting Signal Officer and Assistant, and those for the Pacific Coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Assistant Professor C. F. Marvin.

Percentages of indications verified, February, 1889.

States.		States.	
Maine	79.5	Tennessee	84.7
New Hampshire	80.7	Kentucky	83.4
Vermont	83.8	Ohio	79.4
Massachusetts	85.2	West Virginia	75.1
Rhode Island	84.6	Indiana	77.8
Connecticut	83.0	Illinois	80.4
Eastern New York	82.0	Lower Michigan	78.5
Western New York	76.5	Upper Michigan	76.9
Eastern Pennsylvania	80.6	Wisconsin	76.4
Western Pennsylvania	72.5	Minnesota	77.5
New Jersey	78.1	Iowa	77.0
Delaware	80.1	Kansas	79.0
Maryland	78.1	Nebraska	80.9
District of Columbia	78.0	Missouri	80.1
Virginia	78.2	Colorado	79.4
North Carolina	86.5	Dakota	79.9
South Carolina	86.6	Southern California*	87.4
Georgia	84.2	Northern California*	81.5
Eastern Florida	79.2	Oregon*	69.4
Western Florida	76.6	Washington Territory*	64.3
Alabama	79.5	*By elements:* Weather	81.4
Mississippi	80.7	Temperature	78.0
Louisiana	80.1	Monthly percentage of weather and temperature combined†	80.0
Texas	77.1		
Arkansas	85.7		

*In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. †The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

CAUTIONARY SIGNALS FOR FEBRUARY, 1889.

Statement showing percentages of justifications of wind signals and cold-wave signals for the month of February, 1889:

Wind signals.—(Ordered by 1st Lieutenant Richard E. Thompson.) Total number of signals ordered, fifty-six; justified as to velocity, wholly, thirty-three, partly, five; justified as to direction, forty-nine. Of the signals ordered, twenty were cautionary, of which eight were wholly, and two partly justified; thirty-six were storm signals, of which twenty-five were wholly, and three partly justified. Number of signals ordered for easterly winds, twelve; justified, nine. Number of signals ordered for westerly winds, forty-four; justified, forty. Number of signals ordered late, three. Number of winds without signals, twenty-eight. Percentage of justifications, 57.7.

Cold-wave signals.—(Ordered by Assistant Prof. T. Russell.) Total number of signals ordered, three hundred and fifty-one, of which two hundred and twenty-six were wholly, and eight partly justified Thirty-four signals were ordered late. Number of severe cold-waves without signals, twenty. Percentage of justifications, 61.9.

The predictions for districts east of the Rocky Mountains for March, 1889, were made by Assistant Professor H. A. Hazen, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Assistant Professor C. F. Marvin.

Percentages of indications verified, March, 1889.

States.		States.	
Maine	79.5	Tennessee	81.2
New Hampshire	78.1	Kentucky	80.4
Vermont	79.6	Ohio	73.4
Massachusetts	81.7	West Virginia	71.4
Rhode Island	83.7	Indiana	75.2
Connecticut	85.6	Illinois	75.2
Eastern New York	77.7	Lower Michigan	72.5
Western New York	74.6	Upper Michigan	70.7
Eastern Pennsylvania	82.1	Wisconsin	80.3
Western Pennsylvania	72.8	Minnesota	77.5
New Jersey	83.2	Iowa	83.5
Delaware	81.1	Kansas	77.5
Maryland	80.3	Nebraska	83.5
District of Columbia	83.4	Missouri	78.8
Virginia	80.6	Colorado	78.1
North Carolina	83.4	Dakota	81.9
South Carolina	86.0	Southern California*	86.4
Georgia	86.3	Northern California*	89.0
Eastern Florida	87.5	Oregon*	80.6
Western Florida	90.8	Washington Territory*	85.4
Alabama	88.0	*By elements:* Weather	86.5
Mississippi	84.1	Temperature	70.7
Louisiana	84.1	Monthly percentage of weather and temperature combined†	80.2
Texas	71.7		
Arkansas	79.2		

*In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. †The monthly percentage of weather and tem-

perature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

CAUTIONARY SIGNALS FOR MARCH, 1889.

Statement showing percentages of justifications of wind signals and cold-wave signals for the month of March, 1889:

Wind signals.—(Ordered by Assistant Prof. H. A. Hazen.) Total number of signals ordered, one hundred and five; justified as to velocity, wholly, seventy-one, partly, eight; justified as to direction, ninety-seven. Of the signals ordered, sixty-six were cautionary, of which forty-two were wholly, and four partly justified. Number of storm signals ordered, thirty-nine; justified, wholly, twenty-nine, partly, four. Number of signals ordered for easterly winds, sixty-two; justified, fifty-four. Number of signals ordered for westerly winds, forty-three; justified, forty-three. Number of signals ordered late, nine. Number of winds without signals, twenty-five. Percentage of justifications, 69.7.

Cold-wave signals.—(Ordered by Assistant Prof. T. Russell.) Total number of signals ordered, one hundred and thirty-three, of which forty-three were wholly, and nine partly justified. Five signals were ordered late. Number of severe cold-waves without signals, nineteen. Percentage of justifications, 43.8.

Percentages of local verifications of weather and temperature signals as reported by directors of the various State Weather Services for March, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois	83.7	76.8	Nebraska	85.3	86.1
Indiana	81.7	77.6	New Jersey	76.0	92.7
Kansas	89.2	89.3	New York	72.0	80.0
Kentucky	83.0	78.0	North Carolina	83.6	80.1
Louisiana (northern)	90.0	81.0	Ohio	83.0	82.0
Louisiana (southern)	96.0	83.0	South Carolina	87.0	89.0
Michigan	78.7	80.9	Tennessee	93.0	85.5
Minnesota	83.0	76.0			

STATE WEATHER SERVICES.

[*Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.*]

The following extracts are republished from reports for March, 1889, of the directors of the various state weather services:

ALABAMA.

The month has been very dry and the average precipitation was 2.24 below the normal. This deficiency of rain has injuriously affected the grain crop and has rendered the land so dry that it has been difficult to properly prepare it for cotton planting. The average temperature was also below the normal, 1.6.

The month closed with a decidedly better change in the weather, and farmers are rapidly preparing the land for cotton seed and the growing grain.

SUMMARY.

Temperature.—Monthly mean, 53.8; highest monthly mean, 59.3, at Tuscaloosa; lowest monthly mean, 48, at Valley Head; maximum, 85, at Tuscumbia, 16th; minimum, 20, at Valley Head, 10th; range for state, 65; greatest local monthly range, 60, at Valley Head; least local monthly range, 29.7, at New Market.

Precipitation.—Average for the state, 2.92; greatest, 4.22, at Motes; least, 1.52, at Greensborough.

Wind.—Prevailing direction, northwest.—*P. H. Mell, Signal Corps, Auburn, director.*

ARKANSAS.

SUMMARY.

Temperature.—Monthly mean, 52.9; highest monthly mean, 56.3 at Lonoke; lowest monthly mean, 49.8, at Alexandria and Ozone; maximum, 84, at Lead Hill, 29th; minimum, 22, at Lead Hill, 9th; range for state, 62; greatest local monthly range, 62, at Lead Hill; least local monthly range, 28, at Dallas.

Precipitation.—Average for the state, 5.11; greatest, 8.28, at Heber; least, 0.30, at Helena.—*Prof. John C. Branner, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

COLORADO.

SUMMARY.

Temperature.—Monthly mean, 36.1; highest monthly mean, 46.4, at Cañon City; lowest monthly mean, 18.2, at Alma; maximum, 72, at Longmont, 28th; minimum, —3.0, at Breckenridge, 23d; range for state, 75; greatest local monthly range, 38.7, at Breckenridge; least local monthly range, 16.1, at Dolly Varden Mine.

Precipitation.—Average for the state, 0.56; greatest, 1.80, at Burlington; least, trace, at Saguache.—*Prof. F. H. Loud, Colorado Springs, director; T. W. Sherwood, Corporal, Signal Corps, assistant.*

ILLINOIS.

SUMMARY.

Temperature.—Monthly mean, 41.9; highest monthly mean, 49.3, at Fairfield; lowest monthly mean, 25.3, at Lake Forest; maximum, 78, at Pontiac and Sterling, 15th; at Flora 16th, and at Golconda, 19th; minimum, 10, at Dwight, 28th; range for state, 68; greatest local monthly range, 64, at Pontiac; least local monthly range, 42, at Mascoutah.

Precipitation.—Average for the state, 1.63; greatest, 4.34, at Atwood; least, 0.70, at Vandalia and Mount Morris.

Wind.—prevailing direction, northwest.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

INDIANA.

The mean temperature for March was greatly in excess of the normal, the departures at different stations ranging from 0.2 to 6.2. The average departure for the state is probably 2.8. The highest temperature occurred at most stations from the 15th to the 17th, and was only slightly below the maximum temperature noted in former years. The lowest temperature was noted on the 9th and 11th, at most stations, and at a few stations on the 30th, the minimum temperature not being very low and far above the average minimum for many years.

The precipitation during the month was everywhere below the normal, the departures ranging from 0.14 to 3.20, the average deficiency being nearly 1.31. The least precipitation fell in the southern portion, and the greatest in the northern. The heaviest rainfall occurred at most stations on the 31st. Snow fell only on a few days and in small quantities.

SUMMARY.

Temperature.—Monthly mean, 41.3; highest monthly mean, 46.5, at Princeton; lowest monthly mean, 36.6, at Columbia City; maximum, 81.0, at Marengo, 17th; minimum, 14.0, at Delphi and Angola, 30th; range for state, 67.0; greatest local monthly range, 56.0, at Marengo and Vevay; least local monthly range, 43.0, at Seymour, Franklin, and Columbia City.

Precipitation.—Average for the state, 1.51; greatest, 2.46, at Columbia City; least, 0.80, at Huntingburgh.

Wind.—Prevailing direction, northwest.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

IOWA.

The month was extraordinarily warm, dry, and fine, northwesterly winds and calm prevailing. The mean temperature was 8.3 above the normal. Since 1860, March has twice been as warm, in 1860 and 1868, and once warmer, in 1878. The middle decade of the month was the warmest, it being 13 above the normal; the first and last decades exceeded the normal by only half that amount. The warmest days of the month were the 14th and 15th, exceeding the normal by 20; on four days only was the temperature slightly below the normal, and it did not fall below 20 at the central station.

The total rainfall throughout the state was exceedingly small; in the central portion of the state no measurable amount of precipitation fell; in the western, eastern, and southern portions the total precipitation averaged about 0.25, and in the extreme southeast and skirting the Mississippi from Keokuk to Clinton the rainfall reached and slightly exceeded 1.00. The light thunder showers of the 15th and 30th brought nearly all the rain that fell during the month; the first occurred mainly in the northwest, and the latter with hail, in the southeast.—*Dr. Gustavus Hinrichs, Iowa City, director.*

KANSAS.

The month has been an unusual one in many respects; seldom has the state experienced a warmer and wetter March, and the absence of the usual March gales has been conspicuous. The close of the month finds the pastures turning green, the winter wheat in a most excellent condition, oats in part sown, plowing for corn in progress, with some planted, and the season generally ten days in advance. The temperature is from 1 to 5 above the normal, the least excess being in the southeastern counties and the greatest in the northeastern.

There is an excess of precipitation except in the extreme northeastern and southwestern counties. The greatest excess extends from the southeastern counties northwestward passing out of the state through Republic, Jewell, and Smith counties. The largest excess and greatest precipitation in any one county occurs in Geary; another heavy excess occurs in the northwestern part of Logan. The deficiency is quite marked in the northeastern counties, where it amounts to 1.00. A peculiar local deficiency appears in the northern portion of Barton, eastern part of Ellis, and greater part of Russell.

SUMMARY.

Temperature.—Monthly mean, 43.0; highest monthly mean, 49.5, at Rome;

lowest monthly mean, 34.8, at Gibson; maximum, 86, at Russell, 6th; minimum, 10, at Cunningham, 10th; range for state, 76; greatest local monthly range, 72, at Russell; least local monthly range, 41, at Kanopolis; greatest daily range, 50, at Russell, 6th; least daily range, 2, at Manhattan, 15th.

Precipitation.—Average for the state, 1.69; greatest, 4.16, at Junction City; least, 0.30, at Victoria.

Wind.—Prevailing direction, north.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

KENTUCKY.

SUMMARY.

Temperature.—The average for the state, as determined from the tri-daily observations, was 46.5; from the mean of the average maximum and minimum, 46; these figures indicate an excess of about 2.0 above the normal; average maximum for the state, 57.2; average minimum, 36.9; maximum, 82, at Bowling Green, 13th; minimum, 18, at Ashland, 11th; average monthly range, 51.4; greatest local monthly range, 60, at Bowling Green; least, 44, at Millersburgh; the warmest days of the month were the 17th, 18th, and 31st, and the coldest the 9th and 11th.

Precipitation.—The average precipitation for the state, 1.52, is about 2.50 less than the normal; greatest, 2.98, at Richmond; least, 0.43, at South Fork. Snow fell to the depth of 1.0 in the eastern and northern portions of the state. There was less than the usual amount of frost during the month, and but little damage to crops resulted from it. The number of clear and fair days was largely in excess of the average.—*Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.*

LOUISIANA.

There was a deficiency of 1.5 in the mean temperature of the month as compared with the March normal of past twenty years. The coolest portion of the month was from the 10th to 12th, and the warmest about the 16th, 29–30th. There was a greater average percentage of sunshine than in March, 1888, fewer rainy days, and about two inches less rainfall.

SUMMARY.

Temperature.—Monthly mean, 58.2; highest monthly mean, 61.9, at Cameron; lowest monthly mean, 36.0, at North Louisiana Experimental Station; maximum, 88, at Minden, 29th; minimum, 22, at North Louisiana Experimental Station, 11th; range for state, 66; greatest local monthly range, 58, at North Louisiana Experimental Station; least, 26, at Shell Beach; mean daily range, 21.7.

Precipitation.—Average for the state, 3.68; for the northern section, 3.69; and for the southern section, 3.68; greatest local monthly rainfall, 7.02, at Vicksburg, Miss.; least monthly rainfall, 1.34, at Marksville; greatest daily rainfall, 2.79, at Plaquemine, 22–23d.

Wind.—Prevailing direction, north.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

MICHIGAN.

The month has been remarkable for the warm and pleasant weather which has prevailed, the many clear days, and the great deficiency in precipitation, and lack of any general or severe storms. The mean temperature is 4.1 above the normal of fourteen years. The temperature was above the normal on twenty-three days, normal on one, and below the normal on seven days.

The average precipitation for the month is 1.63 below the normal of fourteen years; it was below the normal in all sections, and the greatest deficiency, 2.05, occurred in the northern, and the least, 0.61, in the southern section. The snowfall for the month was very light, and fell principally on the 29th and 31st. The average total fall of snow on the level for the state during the month was 3.9.

SUMMARY.

Temperature.—Monthly mean, 33.2; highest monthly mean, 38.4, at Marshall; lowest monthly mean, 27.2; at Gaylord; maximum, 71, at Gladwin, 17th; minimum, 2, at Gaylord, 9th; range for state, 69; greatest local monthly range, 62, at Gladwin; least local monthly range, 28, at Pulaski; greatest daily range, 50, at Gladwin, 23d; least daily range, 2, at Manistee, 29th.

Precipitation.—Average for the state, 0.87; greatest, 2.27, at Buchanan; least, 0.04, at Mio.

Wind.—Prevailing direction, northwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

MINNESOTA.

The month was much warmer than usual and there was a deficiency of more than one-third in the precipitation. As regards the season, the month was about two weeks in advance.

SUMMARY.

Temperature.—The average temperature for the state, 33.3, is nearly 10 above the normal. The maximum, 70, was recorded at Morris, 24th, and the minimum, —9, at Saint Vincent, 13th; range for state, 79. With a single exception of March, 1878, the month was the warmest March in Minnesota since the establishment of the Signal Service stations in 1871. From the southern border of the state to the latitude of Saint Paul, the month was about 7 warmer than usual; the temperature was 8.5 above the normal at Duluth, 10 at Minneapolis, 12 at Moorhead, and nearly 15 above at Saint Vincent.

Precipitation.—The average precipitation for the state is 0.74, or 36 per cent. less than the normal. The fall of snow and rain was in excess of the normal in that portion of the state bordering on Lake Superior; elsewhere it was deficient. The deficiency equaled 43 per cent. in the southern half of the state and 65 per cent. in the northern part. From the 1st to 12th there was no precipitation of any consequence. Snow was quite general on the 13th and 14th, and rain on the 15th and 16th. Dry weather prevailed from the 17th to 28th. Light snow occurred on the 29th and 30th, but disappeared on the last day of the month.

Wind.—Prevailing direction, northwest.—*Prof. W. W. Payne, Northfield, director; John Healy, Private, Signal Corps, Saint Paul, assistant.*

MISSISSIPPI.

SUMMARY.

Temperature.—The average for the state, 55.8, is about 0.6, below the normal; highest monthly mean, 60.5, at Logtown; lowest monthly mean, 50.9, at Batesville; maximum, 85, at Louisville, 17th; minimum, 27, at Pontotoc, 10th. Frost occurred in the northern division on the 4th, 6th, 8th, 10th, 11th, 12th, and 29th; the last severe frost was noted on the 12th.

Precipitation.—The average for the state, 3.93, is 2.22 below the normal; greatest, 7.02, at Vicksburg; least, 0.70, at Kosciusko; rain fell generally throughout the state on the 1st, 2d, 3d, 17th, 23d, 24th, 25th, and in the northern portion of the state from the 28th to the 31st.

Wind.—Prevailing directions, north and northwest.—*R. B. Fulton, Signal Corps, University, director.*

MISSOURI.

SUMMARY.

Temperature.—The mean for March was 44.9. The highest temperature reported was 84, at Protem, and the lowest, 13, at Ozark. The average of maximum temperatures was 75.5, and the average of minimum temperatures was 21.6, making an average range of 51.9. The highest temperature occurred on the 14th, 15th, 25th, 29th, and the lowest on the 9th, 10th, and 11th.

Precipitation.—The average precipitation was 2.04, which was 0.14 below the March normal. The greatest amount of precipitation reported was 5.92, at Springfield, and the least, 0.09, at Conception. In the state, as a whole, precipitation occurred on twenty days. The greatest number of days of precipitation in any one place was ten at Springfield.—*Prof. Francis E. Nipher, Saint Louis, director; G. A. Weber, Sergeant, Signal Corps, assistant.*

NEBRASKA.

SUMMARY.

Temperature.—The monthly mean, 42.1, is 6 above the normal, and is the highest mean for the month since 1878; the maximum, 78, has been exceeded four times since 1878. On about one-half of the days of the month the freezing point has been reached, but the thermometer has not fallen to zero.

Precipitation.—The precipitation for the month is quite variable, and has been neither very large nor very small; a narrow strip running north and south through central Nebraska has had over 2.00, and the eastern and western portions of the state received less than 1.00; the border of the above mentioned strip and the southern part of the state generally have had from 1.00 to 2.00, while the eastern and western portions have had less than 1.00, falling to a mere trace at the extreme west.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Corporal, Signal Corps, assistant.*

NEVADA.

SUMMARY.

Temperature.—Monthly mean, 44.1; highest monthly mean, 64.5, at El Dorado Canyon; lowest monthly mean, 31.6, at Elko; maximum, 85.1, at El Dorado Canyon; minimum, 12.0, at Elko; range for state, 73.1.

Precipitation.—Average for the state, 1.38; greatest, 4.45, at Genoa; least, 0.00, at Hot Springs.—*Prof. Chas. W. Friend, Carson City, director; H. F. Alciatore, Private, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

March was warm and dry. The average temperature was about 4 above the average and the precipitation about 1.25 below the average. The precipitation of the month falls into three distinct periods, viz., 3d–10th, 16th–21st, and 27th–31st. On nine days no rain or snow was recorded in New England.

The first three months of the year taken together show a deficiency of about 0.75 in precipitation, and were much warmer than the average, the excess being about 8. At the close of March the season was well advanced. But little frost remained in the ground, wild flowers had appeared, and the spring birds had returned earlier than usual.

SUMMARY.

Temperature.—Monthly mean, 35.5 (105 stations); highest monthly mean, 39.8, at Olneyville; lowest monthly mean, 28.6, at Mayfield; maximum, 72, at Lunenburgh, 5th; minimum, —6, at West Milan, 1st; range for New England, 78; greatest local monthly range, 68, at West Milan; least local monthly range, 25, at Block Island; greatest daily range, 56, at West Milan, 1st; least daily range, 0.8, at Woonsocket, 5th; the average temperature of March, for 26 stations, having records for more than 10 years, is 31.4; the average for March, 1889, is 35.6—departure +4.2.

Precipitation.—Average for New England, 2.46 (125 stations); greatest, 5.46, at Nantucket (*b*); least, 0.86, at Dudley. The average precipitation for March for 33 stations, having records for more than ten years, is 3.93; the average for March, 1889, is 2.50—departure, —1.43.

Wind.—Prevailing direction, northeast (17 stations).—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; J. W. Smith, Sergeant, Signal Corps, assistant.*

NEW JERSEY.

SUMMARY.

Temperature.—The mean for March, 40.5, is 3.7 above the average determined from past records of forty-nine stations, and is 7.7 above the average for the corresponding month of 1888. The warmest days during the month were the 13th, 23d, and 24th, and the coldest the 1st, 10th, 11th, 12th, 25th, 26th, 29th, 30th, 31st. The lowest temperature recorded in the northern portion of the state was 19, in the central, 22, and in the southern, 28.5.

Precipitation.—The average precipitation for the state, 3.79, is 0.20 below the average determined from past records of forty-nine stations and is 1.92 below the average for the corresponding month of 1888. One station, Bridgeton, reports a total for the month exceeding 6.00; five stations: Egg Harbor City, Freehold, Oceanic, Tom's River, and Trenton, report a total exceeding 5.00, and four stations: Atlantic City, Imlaystown, Ocean City, and New York City, a total exceeding 4.00.

Wind.—Prevailing directions, northeast and northwest.—*Prof. George H. Cook, New Brunswick, director; E. W. McGann, Sergeant, Signal Corps, assistant.*

NEW YORK.

SUMMARY.

Temperature.—Mean for the state, 33.3. The temperature was above the normal at all stations, except Utica, where it was slightly below; maximum, 75, at Nineveh, 22d; minimum, —3.2, at Barnes' Corners, 9th.

Precipitation.—Average for the state, 1.74. The precipitation was below the average at all stations, except Humphrey and New York City, where it was 0.05 and 0.13 above, respectively, and normal at Palermo and Potsdam; average number of days on which precipitation occurred, 9.

Wind.—Prevailing direction, northwest.—*Prof. E. A. Fuertes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

NORTH CAROLINA.

SUMMARY.

Temperature.—Monthly mean, 47.7, highest monthly mean, 52, at Salisbury; lowest monthly mean, 43.1, at Norfolk, Va.; highest temperature, 77, at Morgantown, 17th, and at New Berne, 28th and 31st; lowest temperature, 21.2, at Asheville, 10th; greatest local monthly range, 51, at Asheville; least local monthly range, 28, at Hatteras.

Precipitation.—Average monthly rainfall, 3.06; greatest monthly, 7.52, at Norfolk, Va.; least monthly, 0.43, at Asheville.—*Dr. Herbert B. Battle, Raleigh, director; H. McP. Baldwin, Sergeant, Signal Corps, assistant.*

OHIO.

SUMMARY.

Temperature.—The month was remarkable for having the highest maximum, minimum, and mean temperatures on record for March since the opening of the bureau in 1883. The mean temperature of the northern section was 37.3; of the middle section, 40.9; of the southern section, 43.1. These means are 4.9, 5.4, and 4.1 above the averages for the sections, respectively. The mean for the state, 40.2, was 4.6 above the average. The mean daily range was 19.4. The greatest daily range was 53, at Athens, 30th; the least, 2, at Toledo, 2d, at Jefferson, 10th, and at Cleveland, 21st.

Precipitation—Precipitation was general in all sections on the 1st, 2d, 29th, and 31st. Local rains occurred in the northern section on the 3d, 9th, 10th, 21st, and 22d; in the middle section on the 3d, 7th, 8th, 10th, 18th, and 19th; and in the southern section on the 8th, 9th, 10th, 18th, 20th, and 28th. In the northern section more than one-half the rainfall for the month occurred on the 31st, and at one station, Fostoria, the entire rainfall for the month occurred on that day. The mean rainfall in the northern section was 2.11; in the middle section, 1.04; in the southern section, 1.01; and for the state 1.50. The rainfall in the northern section was .07 above the average for March. In the middle and southern sections it was 1.48 and 1.53 below the averages for those sections, respectively. The average deficiency for the whole state amounted to 0.87. Thunder-storms were general in the northeastern part of the state on the 31st. Greatest monthly rainfall, 3.19, at Oberlin; least, 0.40, at Jacksonborough. The greatest rainfall in any 24 hours was 2.25, at Oberlin, 31st.

Wind.—Prevailing direction, northwest—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

PENNSYLVANIA.

SUMMARY.

Temperature.—The mean temperature for the month, 38.9, is from 2 to 3 above the normal, and 7.8 above that of March, 1888; the mean determined from the daily maximum and minimum temperatures is 39.0. The following stations report the highest average daily temperature: New Castle, 45.3; Selin's Grove, 44.0; Indiana, 43.2; and Pottstown, 43.0. Maximum, 76, at Columbus, 17th; minimum, 4, at Columbus, 11th. The coldest day of the month was the 30th, but the low temperatures that generally occur in March were not reached. The entire month as been characterized by mildness.

Precipitation.—The average precipitation, 2.90, is a deficiency of a little over one-half inch; the distribution was uneven. The largest totals reported were: West Chester, 5.44; McConnellsburgh, 4.76; Coatsville, 4.49 and Ottsville, 4.42; several stations report less than 2.00. The greatest monthly snowfall reported was, 11.50, at Charlesville.

Wind.—Prevailing direction, northwest.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant, in charge.*

SOUTH CAROLINA.

SUMMARY.

Temperature.—The monthly mean, 51.6, is 0.5 below the mean for March, 1888; highest monthly mean, 57.0, at Timmonsville; lowest monthly mean, 47.0, at Spartanburgh; maximum, 77, at Columbia, 31st; minimum, 20, at Cedar Spring, 11th; range for state, 57.

Precipitation.—Average for the state, 3.41; greatest monthly, 7.49, at Charleston; least monthly, 0.30, at Spartanburgh; greatest daily, 3.14, at Charleston, 11th; average number of rainy days, 7.

Wind.—Prevailing direction, west.—*Hon. A. P. Butler, Columbia, director; H. C. Seymour, Private, Signal Corps, assistant.*

TENNESSEE.

The month presented several anomalous features, among which were the small amount of rainfall, the small percentage of cloudiness, and the absence of the usual high winds. Altogether, the month was a very favorable one for the farmer, and the work of planting and preparing for the coming crops was, at the close of the month, much more advanced than usual for the season.

SUMMARY.

Temperature.—The mean temperature, 49.1, is slightly above the normal for the past seven years, and the highest mean during that period; highest monthly mean, 52.8, at McKenzie; lowest monthly mean, 44.3, at Cog Hill; maximum, 82, at Leeville, 14th, and Waynesborough, 18th, and it was the highest maximum recorded in March during the past seven years. Minimum, 16, at Hohenwald, 10th, it being the highest March minimum during the above-mentioned period, except in 1887. The highest temperature throughout the state was recorded on the 17th and 18th, and the lowest, with two or three exceptions, on the 10th. The daily ranges were slightly in excess of the normal. There were two cold-wave warnings received during the month: 15–16th and 27–28th, both of which were verified.

Precipitation.—The average precipitation, 3.01, is 1.75 below the March average for the past seven years, and is just half the average for March of last year. Of this amount the eastern division received an average of about 2.50, the middle division about 3.00, and the western division about 3.75; the greater portion fell during the latter half of the month, the 18th and 19th showing the greatest amount. After the rain of the 1st and 2d, which was generally heavy until the 18th, there was a period of almost entire absence of rainfall. A good rain fell on the 24th, 25th, and 31st in the middle and western divisions. The greatest rainfall, 5.33, occurred at Memphis, and the least, 1.50, at McKenzie. A slight fall of snow was reported on the 8th, 9th, 10th, and 28th in the eastern division, but not sufficient to measure.

Wind.—Prevailing direction, northwest.—*J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.*

TEXAS.

SUMMARY.

Temperature.—Monthly mean, 57.2; with the exception of a few places about the normal temperature for March prevailed throughout the state; maximum, 89, at Silver Falls, 29th; minimum, 21, at Fort Elliott, 9th.

Precipitation.—The precipitation during the month has been in excess all over the state, the average being 2.93, which is about 1.00 above the normal. There were two rainy periods during the month, one 1st–2d, and the other, 22d–26th; during each of these periods rain fell throughout the greater part of the state. The only excessive precipitation reported was at Mesquite, where 1.80 fell in one hour and fifteen minutes. Monthly rainfall of less than 1.00 was reported from Brenham, Decatur, and El Paso, while at all other points it ranged from 2.00 to 4.00.—*S. O. Young, M. D., Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.*

Meteorological record of Army post surgeons and voluntary observers, March, 1889.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Alabama.	°	°	°	*Ins.*	*Arizona.*				
Auburn	76	30	54.7	2.81	Antelope Valley	.....	.....	.....	3.14
Bermuda †	80	31	50.1	2.09	Benson*	80	42	61.1	0.63
Citronelle †	82	36	59.5	2.79	Casa Grande*	89	53	66.5	0.90
Decatur †	.....	.....	.....	2.70	Cedar Springs	.....	.....	.....	1.40
Elkmont †	78	28	50.5	2.95	Curtis	.....	.....	.....	1.01
Florence	76	33	50.6	2.79	Florence	84	41	60.4	2.83
Gadsden †	78	28	51.7	3.95	Fort Apache	79	25	46.5	1.78
Greensborough	82	34	55.5	1.52	Fort Bowie	75	30	50.4	1.48
Livingston †	80	33	55.0	2.08	Fort Huachuca	80	32	51.5	2.71
Mt. Vernon B'ks	83	33	58.5	3.14	Fort Lowell	86	35	58.6	2.46
Mount Willing	79	35	56.7	2.65	Fort McDowell	87	37	59.7	1.33
Motes †	80	26	53.6	4.22	Fort Mojave	88	43	62.8	2.50
New Market †	76	23	50.8	3.87	Fort Verde	80	29	51.7	0.65
Talladega	79	28	56.0	2.97	Globe	81	.....	.....	2.33
Tuscaloosa	75	26	59.3	3.12	Holbrook*	75	26	47.8	0.82
Tuscumbia	85	27	49.7	3.03	Lochiel	.....	.....	.....	1.91
Union Springs	?	34	56.0	2.18	Mount Huachuca*	80	34	51.3	2.61
Uniontown	81	30	58.4	2.43	Pantano*	81	39	56.2	2.06
Valley Head	80	20	48.0	3.50	Phœnix	85	40	60.1	1.00
Wiggins	83	32	54.2	3.41	San Carlos	.....	.....	.....	2.37
Alaska.					San Simon*	76	34	50.5	.....
Killisnoo	52	24	38.4	3.45	Teviston	.....	.....	.....	0.80
					Tucson (1)*	81	44	63.3	1.98

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Arizona—Cont'd.	°	°	°	*Ins.*
Tucson (2)*	80	44	60.9	1.20
Wilcox *	82	34	55.6	1.95
Williams	62	18	38.4	0.95
Willow Springs	.....	.....	.....	5.77
Winslow	71	21	44.4	0.60
Arkansas.				
Alexander	79	24	49.8	6.30
Arkansas City †	.....	.....	.....	3.08
Camden †	78	31	54.8	4.95
Conway	80	30	53.8	6.65
Dardanelle†	.....	.....	.....	3.20
Dallas †	67	39	52.3	6.00
Dayton†	78	30	53.4	3.80
El Dorado †	76	28	51.2	4.75
Forrest City	83	30	56.2	4.00
Fulton †	.....	.....	.....	4.71
Galveston†	78	26	52.3	6.11
Heber	75	25	50.4	8.26
Helena (1) †	.....	.....	.....	3.80
Helena (2)	79	27	53.7	3.00
Hot Springs	80	26	53.6	4.29
Lead Hill	84	22	50.1	3.61
Little Rock B'ks	79	23	54.3	6.06
Lonoke	78	30	56.3	7.30
Madison †	.....	.....	.....	?0.37
Newport †	.....	.....	.....	6.58
Ozone †	72	26	49.8	3.13
Osceola	77	28	51.4	6.06
Portia †	78	24	54.1	5.50
Russellville	81	24	53.3	6.40
Stuttgart †	76	28	52.8	5.25
Texarkana	82	33	54.4	2.62
Washington †	80	28	55.3	4.94
British Columbia.				
New Westminster	65	31	47.8	4.98
California.				
Alcade *	80	42	58.1	4.12
Alcatraz Island	75	45	55.6	9.08
Almaden *	80	51	63.6	6.20
Anaheim *	80	44	58.8	7.97
Anderson †	83	41	58.6	12.00
Angel Island	86	42	58.0	6.64
Antioch *	78	38	54.9	4.81
Aptos *	80	40	56.6	5.90
Athlone *	83	45	61.0	2.48
Auburn *	79	38	55.6	9.57
Bakersfield *	85	48	63.0	1.88
Benicia Barracks	77	38	56.5	5.53
Banning†	83	38	56.8	6.48
Barstow	79	38	57.4	0.93
Berenda *	80	48	60.9	3.02
Borden *	85	45	58.0	1.79
Boulder Creek *	78	34	50.5	19.58
Brentwood *	80	38	62.8	4.57
Brighton *	90	42	60.2	5.46
Byron *	78	46	59.8	4.24
Cactus *	101	51	71.7	.....
Caliente *	85	39	58.5	3.15
Calistoga *	86	35	55.3	10.87
Castroville *	77	41	55.1	4.18
Chico *	.....	45	.....	5.68
Cisco *	55	20	38.1	2.70
Colegrove	.....	.....	.....	5.97
Coles *	78	29	47.2	2.20
Colfax *	76	34	51.0	13.90
Corning *	80	40	55.1	4.37
Downey *	77	45	60.5	4.74
Dunsmuir *	80	38	49.4	4.39
Davisville *	78	46	58.5	6.62
Delano *	85	47	61.6	2.10
Delta *	87	35	55.5	37.52
Dunnigan *	76	44	61.8	6.17
Edgewood *	70	30	45.7	8.43
El Dorado *	80	41	57.0	8.41
Elmira *	97	50	63.3	6.32
El Verano *	83	42	57.2	10.69
Emigrant Gap *	64	27	41.0	5.69
Esperanza *	81	38	55.6	5.70
Farmington *	89	45	57.0	3.07
Felton *	85	32	57.9	13.48
Florence *	80	48	61.1	4.52
Folsom *	80	46	60.6	7.57
Fort Bidwell	74	23	45.1	7.31
Fort Gaston	74	26	50.0	9.48
Fort Mason	74	45	56.1	6.93
Fruto *	78	40	58.6	6.38
Georgetown†	.....	32	.....	12.29
Gilroy *	80	38	56.7	4.22
Girard *	71	38	52.0	3.24
Glen Ellen *	81	38	55.1	16.00
Goshen *	86	35	56.0	1.49
Hanford *	83	40	58.8	1.65
Hollister *	86	38	58.7	3.06
Hornbrook *	75	27	48.6	2.07
Indio *	98	47	63.1	1.05
Ione *	80	38	54.0	5.33
Keeler *	73	39	54.6	0.52
Kingsburgh *	84	45	61.4	2.28
Kings City *	82	33	52.6	6.13
Keene *	72	38	53.1	3.74
Knight's Landing *	78	37	55.0	6.53
Lathrop *	87	40	56.4	2.68
Laurel *	79	40	55.5	17.77
Lemoore *	81	42	62.5	2.09
Lewis Creek *	82	44	60.3	2.45
Livermore *	83	39	57.2	5.15
Livingston *	81	45	59.6	2.67
Long Beach *	88	37	59.9	.....
Los Angeles *	76	46	58.4	6.82
Los Gatos *	84	44	57.5	.....
Mammoth Tank *	91	50	67.1	1.37
Martinez *	72	36	54.8	6.38
Marysville *	82	48	65.1	7.53
Menlo Park *	81	40	56.3	5.75
Merced *	86	42	57.6	1.21
Mojave *	90	38	58.1	3.43
Modesto *	80	45	61.4	1.80
Montague *	71	35	53.8	1.78
Monterey *	68	42	56.1	3.58
Monterey * (Hotel del Monte)	79	45	58.7	.....
Mount Hamilton	64	31	44.8	6.17
Newark *	80	42	.....	5.82
Newman *	87	40	62.5	3.67
Newhall *	84	38	55.0	9.39
Niles *	78	40	58.5	6.00
Norwalk *	80	49	61.4	4.29
Oakland (1)	77	44	56.9	7.60
Oakland (2) *	76	44	56.2	8.26
Oroville *	77	42	59.0	8.98
Pajaro *	80	40	56.1	4.80
Paso Robles *	76	32	54.3	5.55
Placerville *	78	40	53.6	9.89
Pomona *	79	53	62.2	8.62
Presidio of San F	79	41	55.4	7.80
Puente *	80	44	58.5	6.25
Red Bluff *	84	46	57.5	6.05
Redding *	86	43	57.8	10.78
Rocklin *	82	40	57.6	7.48
Rumsey *	70	44	54.1	8.20
Sacramento (1)	78	34	54.5	7.20
Sacramento (2) *	72	46	56.6	5.65
Salinas (1) *k	77	43	55.1	3.33
Salinas (2) *	71	40	53.9	3.04
Sanger Junction *	85	45	61.7	2.94
Salton *	93	50	67.8	1.21
San Ardo *	85	40	57.4	6.16
San Diego B'ks	81	47	59.4	2.13
San Fernando *	80	38	57.4	8.95
San Gabriel *	85	46	62.6	6.16
San José *	78	41	56.7	5.80
San Mateo *	76	40	54.4	6.94
San Miguel *	80	34	55.4	4.10
San Pedro *	82	53	63.7	4.20
Santa Ana *	81	50	61.3	.....
Santa Barbara (1)	81	44	59.0	7.31
Santa Barbara (2) *	78	48	60.0	8.58
Santa Cruz *	78	41	56.3	6.76
Santa Maria *	83	39	.....	4.20
Santa Margarita *	73	30	54.6	8.87
Santa Paula *	85	48	62.0	9.00
Santa Rosa *	79	35	51.8	7.92
Selma *	80	42	56.9	1.85
Seven Palms *	95	50	67.1	1.54
Sims *	75	30	45.2	.....
Soledad *	80	40	53.2	3.35
Soquel *	68	42	55.9	.....
South Side *	72	34	52.3	4.93
South Vallejo *	77	40	53.4	6.19
Spadra *	84	42	58.7	4.97
Stockton *	70	43	55.3	3.58
Suisun *	82	45	59.8	5.05
Summit *	47	18	34.3	.....
Tehama *	80	45	60.1	10.41
Tehachapi *	60	30	45.8	3.56
Templeton *	83	35	56.1	0.35
Towles *	72	34	49.0	.....
Tracy *	75	40	53.3	3.20
Traver *	95	38	57.9	1.90
Tropico *	77	40	55.4	.....
Tulare *	86	46	62.7	2.20
Turlock *	81	44	59.6	2.11
Vacaville *	78	43	57.6	7.92
Valley Springs *	80	40	58.4	4.69
Vina *	80	43	58.3	6.95
Volcano Springs *	98	45	66.9	0.67
Westley *	80	45	61.0	2.60
Whittier *	95	42	63.6	.....
Williams *	68	44	54.5	3.42
Willow (1) *	78	38	56.9	5.03
Willow (2) *	65	40	51.8	.....
Winters *	82	45	60.3	8.40
Woodland *	70	40	54.0	6.21
Colorado.				
Alma	52	3	18.2	0.08
Aspen	.....	.....	31.4	0.54
Agate	.....	.....	43.8	.....
Bennet (1) *	84	19	.....	.....
Bennet (2)	.....	.....	35.0	.....
Breckenridge	61	— 3	.....	.....
Byers	.....	.....	45.6	.....
Burlington	.....	.....	.....	1.80
Cañon City	71	18	46.4	0.20
Cheyenne Well	.....	.....	40.5	2.30
Climax	.....	.....	20.0	0.71
Coulter * †	59	7	31.6	0.60
Deer Trail	.....	.....	39.7	.....
Delta * †	72d	31c	41.7c	0.20
Denver (Jesuit Col)	68	21	42.9	1.72
Denver (near)	72	18	44.5	.....

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Colorado—Cont'd.	°	°	°	*Ins.*
Dolly Varden Mine	33?	0	.....	.....
Durango	.....	.....	.....	2.30?
Eagle Farm	.....	.....	.....	0.45
First View	.....	.....	39.8	.....
Fort Collins	68	17	41.1	0.65
Fort Crawford	68	22	43.5	.....
Fort Lewis	63	8	34.8	0.95
Fort Lyon	77	13	43.3	0.04
Georgetown	56	18	35.2	0.45
Glenwood Springs	71	22	41.9	1.00
Greeley	68	16	32.0	0.58
Grand Lake *	61	— 3	29.0	0.70
Gunnison	.....	.....	34.3	0.05
Hartsel	56	0	.....	.....
Hugo	.....	.....	43.9	.....
Husted	65	18	.....	0.27
Idaho Springs	62	15	36.5	0.84
Julesburgh	70	.....	40.0	0.72
Kit Carson	.....	.....	38.1	.....
Kremmling *	56	2	33.4	.....
Leadville	49	8	27.1	0.68
Lamar	.....	.....	.....	0.64
Longmont †	72	14	40.7	0.41
Magnolia	.....	.....	42.3	.....
Paoli	.....	.....	39.8	0.08
Palmer Lake	62	19	.....	0.71
Ranch near Como	54	8	28.4	0.41
Rifle Falls	.....	.....	37.5	1.12
River Bend	.....	.....	39.4	.....
Rocky Ford *	73	23	45.4	0.67
Saguache	69	14	36.9	T.
San Luis Exp'l Sta.	.....	.....	36.1	0.20
T. S. Ranch	.....	.....	44.6	0.38
Thon	62	14	38.7	0.35
Watkins	.....	.....	42.6	.....
Connecticut.				
Birmingham	.....	.....	.....	1.35
Canton	60	14	.....	1.76
Clark's Falls	.....	.....	.....	2.31
Colchester	62	20	37.1	.....
Fort Trumbull	60	25	39.2	2.09
Hartford	.....	.....	.....	1.97
Lake Konomoc	.....	.....	.....	2.93
Mansfield	60	17	34.9	1.96
Middletown	66	22	37.0	2.55
New Hartford (1)	60	12	32.1	2.23
New Hartford (2)	.....	.....	.....	1.85
Shelton	62	18	37.4	2.42
Thompson	60	16	34.3	.....
Uncasville	.....	.....	.....	3.12
Voluntown *	58	21	37.0	2.85
Wallingford	.....	.....	.....	3.59
Waterbury	65	18	37.0	2.02
Dakota.				
Brookings *	68	4	33.1	0.16
Carrington	77	— 4	35.0	0.17
Davenport	68	— 2	32.9	0.05
De Smet * †	.....	10	31.6	0.04
Fort A. Lincoln	67	2	35.1	0.70
Fort Bennett	75	10	39.8	0.69
Fort Buford	78	— 3	38.0	0.19
Fort Meade	68	5	36.4	0.12
Fort Pembina	70	— 8	29.4	0.32
Fort Randall	74	12	41.9	0.25
Fort Sisseton	69	— 3	33.0	.....
Fort Sully	74	11	42.7	0.60
Fort Totten	71	— 3	35.5	0.16
Fort Yates	70	5	34.8	0.40
Gallatin *	66	— 6	28.2	.....
Garden City f *	65	2	25.4	0.20
Kimball †	68*	9	33.0	0.12
New England City †	66	0	32.7	0.02
Onida *	76	8	33.8	.....
Spearfish * †	68	9	39.3	0.40
Spring Lake *	72	10	34.2	0.50
Webster †	71	0	33.9	1.94
Wolsey	70	7	33.2	T.
Woonsocket	73	8	34.4	0.12
Delaware.				
Kirkwood *	.....	28	37.6	.....
Newark	64	25	41.4	4.38
Viola †	.....	29	37.8	7.27
District of Columbia.				
Kendall Green *	63	30	40.3	4.31
Florida.				
Archer *	85	46	61.2	1.25
Altamonte Springs †	83	40	62.4	2.39
Alva †	85	42	63.7	2.38
Fort Barancas	78	32	58.4	8.02
Fort Meade *	83	38	58.0	1.50
Homeland *	85	46	63.4	1.20
Kissimmee City	85	41	62.1	1.74
Lake City †	87	34	59.4	3.17
Manatee †	84	41	63.6	2.20
Matanzas *	77	42	57.7	2.76
Merritt's Island *	81	46	61.6	1.03
St. Francis B'ks	79	40	58.4	2.21
Tallahassee †	80	36	57.6	2.75
Villa City * †	83	46	62.0	3.44
Georgia.				
Athens	79	29	52.7	2.97
Diamond *	.....	35	51.6	6.85
Duck †	74	25	45.4	2.71
Forsyth *	83	34	57.4	2.48
Hephzibah *	76	38	58.0	2.21
Marietta * †	76	30	50.5	3.29
Milledgeville †	79	29	53.7	3.19
Quitman *	78	37	55.7	3.75
Thomasville	80	34	57.9	2.86
Idaho.				
Boisé Barracks	73	28	49.1	0.68
Fort Sherman	71	25	43.6	2.59
Lewiston	72	30	48.0	1.30
Illinois.				
Aledo	70	22	.....	1.49
Atwood	76	18	.....	4.34
Aurora	72	17	35.6	1.47
Beason	71	20	39.6	1.61
Belvidere	68	22	38.0	1.55
Brush Hill	74	26	42.1	1.17
Cedarville	70	19	37.6	0.87
Centralia	74	26	46.0	1.15
Charleston	74	21	42.1	1.25
Chicago (1)	.....	32	43.6[1]	.....
Chicago (2)	66	19	38.0	1.60
Collinsville	73	24	48.7	1.70
Dwight	74	10	.....	2.23
Fairfield	77	27	49.3	2.21
Flora	78	21	46.0	2.23
Fort Sheridan	64	14	34.9	1.40
Golconda	78	26	48.5	1.58
Grand Tower †	.....	.....	.....	2.10
Greenville	75	22	43.9	1.81
Griggsville	70	26	40.9	1.05
Hennepin	77	16	.....	1.60
Irishtown	76	29	44.9	1.81
Jordan's Grove	76	25	45.4	1.68
Lacon	75	24	41.3	1.99
Lake Forest	62	16	35.3	1.82
Lanark	74	21	42.0	1.49
Martinsville	75	22	43.1	0.99
Mascoutah	70	28	.....	0.80
Mattoon (1) *	75	20	42.0	1.40
Mattoon (2)	72	19	50.9	0.75
McLeansborough	77	23	46.7	1.95
Mount Carmel †	.....	.....	.....	1.47
Mount Morris *	70	20	37.8	0.70
Olney	74	26	43.6	1.91
Oneida	72	20	39.8	1.35
Oswego *	68	20	37.3	1.28
Ottawa	72	22	38.4	1.77
Palestine †	74	24	45.6	1.71
Pana	76	30	46.8	3.25
Pekin	74	18	42.2	2.02
Peoria	75	23	43.1	1.50
Petersburgh	74	22	42.4	2.50
Philo *	73	16	41.3	1.36
Pontiac	78	14	40.3	1.53
Richview	73	24	46.1	2.86
Riley	67	18	36.2	1.56
Rock Island Ars'l	68	21	40.7	2.31
Rockford	67	21	38.3	1.32
Rushville	72	22	42.8	0.81
Sandwich *	73	23	41.8	0.87
South Evanston	65	15	36.4	1.48
Sterling	78	32	40.1	.....
Sumner	76	22	43.5	1.40
Sycamore *	69	18	36.6	1.39
Vandalia	70	24	44.0	0.70
Watseka	72	19	39.0	1.65
Wheaton	70	18	36.5	.....
White Hall	72	24	46.0	2.51
Willow Hill	72	27	45.6	0.72
Windsor † h	67	21	41.0	1.69
Winnebago	70	20	38.0	1.40
Indiana.				
Angola	63	14	38.0	2.36
Blue Lick	74	17	46.0	0.87
Butlerville *	76	23	45.3	1.14
Cannelton	76	21	44.0	1.00
Columbia City	62	19	36.6	2.46
Columbus	72	24	41.1	0.87
Connersville	73	24	43.3	0.85
Dana *	70	22	42.2	2.28
De Gonia Springs	72	26	45.4	1.81
Delphi	70	14	37.7	1.18
Evansville †	.....	.....	.....	0.13
Farmland	70	18	42.4	1.72
Franklin	69	26	43.0	1.35
Huntertown *	58	24	40.6	1.69
Huntingburgh	76	28	46.0	0.80
Huntington †	.....	.....	.....	0.99
Jeffersonville	73	25	46.3	0.89
La Fayette	71	19	39.8	1.69
Logansport †	.....	.....	.....	1.50
Marengo	81	25	45.4	1.10
Marion	62	22	39.5	1.70
Muncie	72	26	43.3	.....
Mauzy	69	19	38.3	1.70
Mount Vernon (1) †	.....	.....	.....	1.15
Mount Vernon (2)	73	26	45.3	1.29
New Providence	76	18	44.7	0.85
Point Isabel	80	20	42.1	2.00
Princeton †	76	27	46.5	2.00
Richmond	69	17	37.9	0.82
Rockville	70	22	39.0	1.25
Rushville †	.....	.....	.....	1.78
Salem * †	.....	22	41.4	1.06
Scalesville	78	27	49.0	2.15
Sunman †	72	22	42.4	1.23

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Indiana—Cont'd.	°	°	°	*Ins.*
Seymour	70	27	43.2	0.93
Spiceland	72	22	43.0	2.08
Vevay	76	20	45.9	0.85
Vincennes †	.....	.....	.....	1.19
Worthington	73	22	41.1	2.01
Indian Territory.				
Caddo Creek *	80	26	51.4	.....
Cantonment †	.....	.....	.....	2.02
Eufaula †	.....	.....	.....	2.71
Fort Gibson	80	25	50.6	3.41
Fort Reno	77	22	51.4	2.59
Fort Sill	80	25	52.0	1.63
Fort Supply	78	18	48.3	2.11
Jimtown †	76	.....	.....	0.50
Tulsa †	.....	.....	.....	4.00
Woodward †	.....	.....	.....	2.66
Iowa.				
Ames *	68	18	39.3	T.
Amana †	66	17	37.2	0.38
Bancroft	73	12	34.1	T.
Blakeville *	80	18	36.2	0.00
Cedar Rapids	69	18	39.8	0.42
Clarinda *	73	17	41.2	0.25
Clear Lake †	68	14	37.0	0.15
Clinton	72	20	39.2	1.19
Cresco	68	13	35.1	0.22
Denmark *	66	.....	.....	1.75
Des Moines	66	15	41.1	T.
Dunkerton *	69d	19h	40.2h	0.05
Dysart *	63	15	35.8	0.00
Elkader *	65	20	39.2	0.40
Fayette †	68	12	37.9	0.39
Fort Madison *	67	22	42.6	1.42
Gillett * †	.....	18	32.8	0.40
Glenwood (1)	76	14	43.4	0.72
Glenwood (2) *	70	8	43.8	.....
Grinnell	68	15	38.5	0.33
Hampton	67	14	36.6	0.16
Independence *	63	21	39.4	0.38
Iowa City	60	21	37.4	0.53
Logan †	70	12	42.1	0.69
Maquoketa *	70	320	.....	0.66
Manson *	68	16	38.0	0.20
Monticello	68	16	39.4	0.15
Mount Pleasant * †	65	25	41.9	0.50
Mount Vernon	.....	.....	41.8	0.17
Muscatine *	70	22	40.2	0.65
Osage	.....	.....	.....	T.
Osceola *	.....	20	40.3	0.00?
Oskaloosa *	71	20	42.8	.....
Sac City *	66	15	36.6	0.30
Vinton *	67	18	39.3	0.29
Washington	76	21	42.8	0.69
Webster City *	68	20	36.8	0.06
Wesley †	66	10	36.6	0.10
Kansas.				
Allison *	70	14	37.1	1.45
Arlington	.....	.....	.....	2.00
Augusta	.....	.....	.....	2.59
Belleville *	68	.....	.....	2.13
Bendena *	.....	36	48.1	0.88
Bucklin	.....	.....	.....	2.20
Buffalo Park *	72	30	.....	.....
Brookville *	82	20	48.2	2.40
Bunker Hill *	82	16	43.6	0.40
Burr Oak	66	15	.....	2.35
Carneiro *	70	22	.....	0.88
Cawker City	72	19	45.9	1.80
Colby	70	18	39.8	1.22
Collyer *	70	25	.....	.....
Concordia	76	12	43.6	1.73
Conway	.....	.....	.....	1.15
Cunningham *	77	10	43.8	1.89
Dorrance *	80	20	.....	1.50
Elco	.....	.....	.....	1.90
Ellis *	73	20	47.4	.....
Elk Falls †	80	20	48.8	2.63
Ellsworth *	70	18	45.3	1.00
Emporia	74	18	45.6	3.06
Englewood *	81	25	47.3	1.15
Fort Hays	74	12	44.8	1.50
Ft. Leavenworth (1)	74	20	46.6	1.43
Ft. Leavenworth (2)	69	19	44.2	1.39
Fort Riley	.....	16	44.0	2.87
Gibson	76	16	34.8	1.18
Globe *	70	20	43.5	2.68
Gorham *	74	24	.....	.....
Grainfield *	76	26	.....	1.00
Grinnell *	76	20	37.6	0.40
Grenola *	81	18	45.7	1.30
Halstead	73	14	45.7	1.46
Haven	.....	.....	.....	2.25
Havensville *	74	14	41.6	2.00
Hays City *	79	28	.....	1.50
Hugoton	.....	.....	.....	0.75
Hymer	.....	.....	.....	2.15
Independence *	77	20	45.8	3.42
Junction City	.....	.....	.....	4.16
Kanopolis *	72	31	.....	1.33
Kirwin †	.....	.....	.....	2.01
La Harpe *	64	26	43.2	2.77
Lawrence	77	13	41.6	2.30
Lebo	79	17	45.8	2.72
Leoti †	.....	20	.....	0.35
Lisbon	74	26	43.2	1.50

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Kansas—Cont'd.	°	°	°	*Ins.*
Macksville	78	16	45.0	1.43
Manhattan	74	14	41.3	1.97
McAllaster *	72	20	42.2	.....
McPherson	.....	.....	.....	1.00
Montero *	75	20	37.4	0.50
Monument *	70	20	.....	0.80
Morse *	62	14	39.7	2.00
Oakley *	74	26	.....	.....
Oberlin †	.....	.....	.....	1.24
Offerle	80	21	44.2	2.08
Ogallah *	72	30	.....	.....
Quinter *	74	24	.....	.....
Rome *	77	18	49.5	2.04
Russell *	86	14	42.4	0.35
Salina *	76	16	43.0	1.80
Santa Fé †	79	18	42.5	.....
Sedan *	80	24	47.0	3.19
Seneca	75	20	42.6	0.75
Sharon Springs	.....	.....	.....	1.84
Shields	.....	.....	.....	1.80
Topeka	.....	.....	.....	2.03
Tribune †	72	20	43.0	0.63
Victoria *	74	18	48.3	0.30
Wakefield *	72	20	44.7	2.57
Wa Keeney *	72	18	42.9	.....
Walker *	80	22	.....	.....
Walnut Grove	78	20	42.7	2.00
Wallace †	.....	.....	.....	1.72
Wellington	72	21	46.9	2.97
Winona	72	26	45.3	3.00
Wilson *	73	16	.....	1.07
Yates Center	80	16	43.8	2.72
Kentucky.				
Ashland † *	.....	18	39.5	2.00
Bernstadt † *	76	25	46.6	2.33
Bowling Green †	82	22	51.3	1.64
Burnside †	.....	.....	.....	3.40
Catlettsburgh †	.....	.....	.....	1.61
Eddyville †	.....	.....	.....	1.04
Falmouth (1) † *	70	22	42.4	1.44
Falmouth (2) †	.....	.....	.....	0.69
Frankfort (1)	79	21	44.8	1.05
Frankfort (2) †	.....	.....	.....	0.92
Franklin † *	78	28	50.7	1.91
Greensburgh †	.....	.....	.....	1.22
Louisa †	.....	.....	.....	0.21
Madisonville † *	74	27	47.5	1.53
McHenry * *f.*	76	26	45.4	1.16
Millersburgh † *	72	28	48.6	1.92
Mount Sterling † *	75	24	43.6	1.82
Newport Barracks	76	22	44.4	0.81
Owensborough † *d.*	77	26	47.1	.....
Owenton †	78	23	45.0	0.87
Paducah †	.....	.....	.....	1.92
Pellville †	84	22	49.8	1.09
Richmond † *	73	25	46.0	2.96
Shelbyville †	78	22	46.0	0.93
South Fork †	77	22	45.0	4.30
Williamsburgh †	.....	.....	.....	1.77
Louisiana.				
Amite City †	79	34	58.3	5.79
Arcadia	83	.....	.....	4.15
Abbeville	78	42	60.0	3.44
Alexandria	82	34	58.6	3.86
Baton Rouge	77	42	61.0	3.60
Cameron †	85	41	60.4	3.16
Clinton	79	31	54.8	4.60
Convent	81	35	59.1	3.14
Coushatta †	.....	.....	.....	5.81
Crowley	77	39	56.9	3.21
Delhi †	.....	.....	.....	4.45
Donaldsonville	78	36	55.1	5.40
Farmerville	80	31	55.2	2.62
Franklinton	76	39	59.9	5.37
Girard †	.....	.....	.....	4.02
Grand Cane	82	35	57.4	4.20
Grand Coteau	76	42	60.4	3.69
Hammond	80	33	57.8	4.30
Houma †	79*	37	59.9	3.80
Jackson Barracks	80	34	59.0	4.69
Kenner	79	40	59.4	2.88
Lake Charles	81	42	61.3	3.10
Lake Providence	86	44	63.2	3.74
Liberty Hill	84	28	57.0	4.54
Luling	79	36	57.6	3.36
Mandeville	78	33	58.3	3.48
Maurepas	79	37	55.5	4.70
Marksville †	80*	38	58.9	1.34
Melville	80	36	59.2	2.18
Minden	88	31	56.4	2.30
Monroe	80	33	57.8	4.05
Mount Airy	79	41	60.0	3.03
New Iberia	82	41	61.5	3.28
Plaquemine	82	34	57.7	3.06
Point Pleasant	79	39	55.7	5.85
Port Eads	74	43	60.3	5.46
Rayville	83	29	58.2	2.87
Shell Beach	74	48	60.7	2.45
Sugar Ex. station	80	22	52.6	1.80
Thibodeaux	.....	.....	.....	2.52
Vidalia	85	32	58.1	3.36
Maine.				
Bar Harbor	55	13	34.5	4.42
Belfast	55	20	34.7	.....
Calais	57	11	33.6	3.59

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Maine—Cont'd.	°	°	°	*Ins.*
Cornish	57	14	33.4	3.17
Fairfield	56	— 2	31.4	3.09
Lewiston	56	4	32.1	3.30
Mayfield	54	1	28.6	.....
Orono †	57	4	33.2	4.62
Maryland.				
Barren Creek Sp'gs †	68	25	41.6	6.76
Cumberland	68	24	41.9	3.52
Fallston	65	26	40.7	5.57
Fort McHenry	63	29	43.9	5.52
Frederick	69	28	41.5	5.16
Gaithersburgh *	.....	25	37.5	.....
Galena † *	.....	32	41.8	4.45
Jewell *	65	31	42.4	5.47
McDonogh	63	26	41.4	4.97
Mt. St. Mary's Coll	64	27	44.2	6.04
Woodstock	67	22	41.5	2.18
Massachusetts.				
Amherst Ex Sta (1)	64	14	36.0	1.46
Amherst Ex Sta (2)	61	23	37.9	1.43
Amherst	65	17	37.1	1.02
Beverly Farms	57	17	33.4	3.26
Blue Hill (sum't)	61	16	34.4	2.62
Blue Hill (base)	64	18	.....	2.25
Blue Hill (valley)	65	16	.....	2.36
Cambridge (1)	60	22	36.4	1.05
Cambridge (2)	61	20	36.6	3.29
Chestnut Hill	64	19	37.0	2.17
Clinton	.....	.....	.....	1.75
Cotuit	56	20	35.8	3.56
Deerfield (1)	63	16	36.2	1.47
Deerfield (2)	62	14	36.9	.....
Dudley	66	15	34.7	1.16
Fall River (1)	58	18	35.5	5.70
Fall River (2)	62	20	37.0	3.39
Framingham	62	18	37.3	2.46
Fiskdale	.....	.....	.....	1.85
Fitchburg (1)	59	20	34.8	1.94
Fitchburg (2)	64	17	36.0	1.83
Fort Warren	64	11	36.8	1.60
Gilbertville	59	7	35.8	2.99
Groton	62	16	36.7	1.47
Heath *	64	10	34.2	.....
Holyoke	69	20	39.2	2.02
Lake Cochituate	66	14	36.8	2.28
Lawrence	64	15	36.0	2.03
Leicester	58	15	33.0	1.22
Leominster	.....	.....	.....	1.67
Long Plain	56	21	35.4	4.21
Lowell (1)	61	16	35.8	1.99
Lowell (2)	64	16	36.3	.....
Ludlow	63	13	34.4	2.09
Lynn	60	19	36.2	2.57
Mansfield	63	20	36.1	1.96
Medford	.....	.....	.....	1.60
Middleborough	63	17	36.3	2.38
Milton *	64	23	37.2	2.73
Monson	65	11	35.2	.....
Mystic Lake	.....	.....	.....	2.36
Mystic Station	.....	.....	.....	2.25
New Bedford (1)	57	19	36.1	2.83
New Bedford (2)	61	13	37.1	2.63
New Bedford (3)	57	22	35.6	2.88
Newburyport (1)	64	21	36.7	3.20
Newburyport (2)	.....	.....	.....	2.72
Northampton	64	20	37.2	1.53
North Billerica	64	15	35.6	1.62
Plymouth	65	27	38.6	2.72
Provincetown	59	21	36.6	2.32
Randolph	.....	.....	.....	2.31
Rowe	54	10	31.3	2.30
Royalston *	58	24	39.3	3.18
Salem	.....	.....	.....	1.66
Somerset	60	20	36.9	2.74
South Hingham	.....	.....	.....	2.82
Springfield	62	20	38.2	1.57
Springfield Armr'y	62	20	37.4	1.57
Taunton (1)	66	20	36.8	1.96
Taunton (2)	65	19	36.7	2.45
Taunton (3)	65	14	35.4	2.08
Waltham	.....	.....	.....	2.03
Wellesley	60	16	37.6	4.95
Westborough	63	18	37.6	2.03
Williamstown	57	13	34.0	1.10
Winchester	.....	.....	.....	3.01
Worcester (1)	62	19	35.8	2.52
Worcester (2)	62	18	37.0	.....
Mexico.				
Guanajuata	80	42	60.3	0.61
La Logia *	92	47	68.4	1.30
Leon de Aldemas	82	42	61.8	0.66
Masatlan	77	64	70.9	0.30
Mexico	81	42	59.9	0.79
Topo Chico	80	54	68.0	3.08
Zacatecas	76	29	52.7	1.69
Michigan.				
Adamsville	.....	.....	.....	1.53
Adrian	68	16	33.3	1.39
Albion	60	18	36.0	2.12
Allegan	.....	.....	.....	1.34
Alma	66	12	32.0	0.51
Arbela	.....	.....	.....	0.85
Atlantic	54	2	27.8	1.00
Bear Lake	59	5	30.9	0.15
Bell Branch	56	18	34.2	0.79

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Michigan—Cont'd.	°	°	°	*Ins.*
Benton Harbor *	67	24	34.4	1.75
Bensonia	61	11	30.8	0.34
Berlin	68	10	34.8	1.08
Berrien Springs *	68	18	36.7	1.80
Big Rapids	63	10	32.6	0.30
Birmingham	63	13	34.7	0.42
Bronson	60	15	31.4	2.11
Buchanan	63	19	35.3	2.27
Calumet	54	7	28.3	0.53
Cassopolis	66	20	36.4	1.44
Charlevoix	60	11	30.6	0.04
Chase	62	10	29.7	0.15
Chelsea	65	13	35.2	1.64
Clinton	.....	.....	.....	1.68
Colon	60	15	33.7	2.09
Columbia	48	15	34.2	2.14
Concord	64	10	34.7	1.68
Corunna	63	13	32.8	.....
Deer Lake	58	16	34.4	0.30
East Saginaw	69	15	34.5	0.56
East Tawas	57	11	33.0	.....
Eden	64	9	37.0	1.25
Fitchburgh	.....	.....	.....	1.33
Fletcher	56	6	33.9	0.10
Flint	69	11	33.3	0.67
Fort Brady	55	5	28.8	0.31
Fort Mackinac	50	8	30.0	0.26
Fort Wayne	65	13	36.8	1.49
Fremont	55	20	34.8	0.44
Gaylord	56	2	27.2	0.19
Gladwin	71	9	37.0	0.15
Grand Rapids	67	15	37.4	0.45
Grape	.....	.....	.....	1.78
Gulliver Lake	53	5	30.4	0.31
Hanover	62	10	35.0	2.15
Harrisville	56	9	32.2	0.20
Hart	68	10	33.3	0.35
Hastings	64	16	35.0	1.41
Hayes	.....	.....	.....	0.25
Highland Station	70	20	32.6	1.02
Hillman	66	9	30.1	0.19
Hillsdale	62	13	34.3	1.64
Hudson	67	7	36.6	1.91
Ionia	64	15	31.3	0.24
Jeddo	60	19	35.8	0.85
Kalamazoo	65	18	39.0	1.84
Kenockee	.....	.....	.....	0.53
Lansing	64	11	36.5	1.14
Lathrop	58	8	29.5	0.46
Madison	60	17	33.4	1.93
Manchester	.....	.....	.....	1.59
Marshall	64	13	37.9	1.88
May	49	17	31.5	0.64
Mio	58	7	29.0	0.04
Montague	63	16	32.2	0.29
Mottville	69	15	37.6	1.96
Noble	.....	.....	.....	1.38
North Aurelius	.....	.....	.....	1.35
North Marshall	63	9	36.0	1.88
Northport	50	12	29.7	.....
Olivet	63	10	34.6	0.72
Ovid	63	10	32.4	0.87
Paw Paw	65	10	34.3	1.43
Petersburgh	66	12	34.3	2.20
Pontiac	54	18	36.6	1.42
Pulaski	46	18	34.2	1.82
Roscommon	63	6	31.1	0.15
Saint Ignace	40	15	29.5	0.05
Saint John's	65	14	33.3	0.85
Sand Beach	58	12	32.3	0.30
Stanton	66	12	33.0	0.39
Stockbridge	.....	.....	.....	1.84
Thornville	53	21	36.2	0.71
Traverse City (1)	58	11	33.0	1.35
Traverse City (2)	63	12	33.4	0.06
Vandalia	54	15	32.3	1.66
Vienna	.....	.....	.....	0.39
Washington	64	14	31.4	1.29
Weldon Creek	.....	.....	.....	0.25
West Branch	57	11	30.5	0.25
Williamston	67	16	37.8	0.92
Ypsilanti (1)	69	9	25.0	1.66
Ypsilanti (2)	66*	16	37.9	1.61
Minnesota.				
Alexandria †	.....	.....	.....	1.26
Brainard	62	2	31.9	0.35
Farmington	66	18	36.6	0.91
Fergus Falls †	.....	.....	.....	T.
Fort Ripley †	.....	.....	.....	1.00
Fort Snelling	68	13	36.0	0.67
Grand Meadow	69	16	34.7	T.
L. Winnibigoshish	64	— 6	30.6	0.82
Leech Lake	64	— 6	30.1	0.93
Le Sueur *	66	12	35.8	1.03
Mankato	68	17	36.9	0.63
Medford	66	12	34.6	0.55
Minneapolis *	63	17	34.9	1.07
Morris	70	8	32.7	0.48
Northfield	66	13	35.9	0.57
Ortonville †	.....	.....	.....	0.20
Pine River	60	— 4	29.3	1.34
Pokegama Falls	65	— 8	29.2	1.34
Red Wing	65	19	35.4	0.51
Redwood Falls †	.....	.....	.....	0.09
Rolling Green	65	17	35.2	0.55

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Minnesota—Cont'd.	°	°	°	*Ins.*
Saint Cloud	67	8	34·8	.....
Tracy	.....	.....	.....	0 35
Mississippi.				
Agricultu'l College.	81	30	54·9	4·63
Batesville†	80	33	50·9	2·90
Canton	.....	.....	.....	4·96
Edwards †	78	32	56·8	4·59
Greenville	80	30	55·7	1·89
Kosciusko†	69	.....	.....	0·70
Lamar*	82	32	56·3	.....
Loch Leven†	80	36	57·8	3·68
Logtown	79	37	59·6	6.09
Louisville†	86	28	56·6	4·61
Macon †‡	78	28	52·6	5·05
Pearlington * †	77	41	59·6	6·05
Pontotoc †	82*	27	53·2	3·03
Riensi *†	77	42	56·8	2·08
Summit † ‖	79	30	56·0	4·24
Water Valley*	82	31	55·7	2·30
Waynesborough †	80*	30	54·8	3·36
Yazoo City †	.....	.....	.....	3·49
Missouri.				
Carthage	.....	.....	.....	4·57
Conception	68	22	43·0	0·90
Craig*	70	16	39·2	0·50
Excelsior Springs*	67	14	40·8	0·75
Fayette†	70	20	45·4	1·09
Fox Creek	74	22	45·8	1·65
Frankford	72	19	38·8	1·45
Glasgow	70	20	41·2	0·90
Grand Pass	70	22	46·5	1·59
Harrisonville	67	20	42·9	2·42
Hermann †	.....	.....	.....	2·43
Ironton	80	26	48·1	3·10
Jefferson Barracks.	74	14	38·6	0·30
Kirksville	72	22	42·6	2·24
Lamonte	73	22	46·2	3·18
Langdon	.....	.....	.....	0·30
Macon City	72	21	43·0	1·32
Mexico	70	21	.....	1·19
Miami	75	20	44·6	1·08
New Frankfort*	64	20	40·9	3·78
Oak Ridge	72	27	47·4	.....
Oregon	75	18	43·8	0·50
Ozark *	76	13	45·7	3·60
Princeton*	70	25	45·3	0·32
Saint Charles (1)	.....	.....	.....	1·40
Saint Charles (2)	74	23	44·9	1·48
Savannah	.....	.....	.....	0·25
Sedalia	75	20	48·1	2·78
Shelbina	.....	.....	.....	1·50
Springfield	74	20	47·1	5·84
Steelville	78	16	.....	2·29
Troy	74	23	42·8	3·25
Willow Springs * †	.....	30	45·6	3·28
Wither's Mill	.....	.....	.....	1·20
Montana.				
Camp Poplar River.	73	— 7	35·4	0·43
Custer †	.....	.....	.....	0·09
Fort Assinaboine	72	4	39·3	0·75
Fort Custer	70	6	40·8	0·25
Fort Keogh	72	3	35·9	1·01
Fort Maginnis	74	5	40·8	1·89
Fort Missoula	70	23	42·9	1·02
Fort Shaw	72	3	41·8	0·34
Galpin †	.....	.....	.....	0·32
Sheldon *	62	15	36·8	1·48
Virginia City	60	15	38·8	0·92
Nebraska.				
Ansley †	76*	7	38·8	2·20
Ashland	71	11	43·3	0·63
Creighton †	76	18	34·9	0·22
Crete	70	15	41·7	1·40
Culbertson (1)*	78	4	44·0	1·19
Culbertson (2) †	.....	.....	.....	1·04
David City*	.....	14	31·6	0·15
De Soto	71	17	41·3	0·53
Fairbury	70	.....	.....	1·75
Falls City†	73	17	40·9	0·55
Franklin	74	8	36·7	2·15
Fort Niobrara	71	8	39·0	0·64
Fort Omaha	82	11	42·8	0·41
Fort Robinson	70	8	43·0	T.
Fort Sidney	68	0	39·7	0·80
Fremont	70*	13	40·8	0·93
Genoa †	68	12	39·9	0·99
Hay Springs	67	4	37·3	0·82
Kennedy†	75	10	39·5	2·00
Lincoln	69	9	42·2	1·01
Marquette*	69	14	.....	1·12
Minden	68	14	41·7	2·83
Nebraska City	70	16	42·5	0·68
North Loup †	68*	7	37·6	0·65
Oakdale	69	7	37·8	0·20
Palmer	70	16	36·8	0·75
Plum Creek*	75	20	46·9	0·14
Ravenna	67	7	.....	1·45
Red Willow	.....	.....	.....	1·54
Sargent	68	14	37·0	0·78
Stratton	59	25	40·9	1·38
Syracuse *	71	15	42·7	0·80
Tecumseh †	64	14	41·6	1·35
Weeping Water*	75	8	39·3	0·74
West Hill	70	12	38·8	0·70
West Point	73	.....	.....	.....

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Nevada.	°	°	°	*Ins.*
Austin	71	20	42·4	.....
Battle Mountain *..	70	30	46·1	1·16
Beowawe *.	78	30	48·0	0·18
Brown's *	77	28	49·5	0·30
Burner's Ranch	.....	.....	.....	3·44
Carlin *	72	20	40·7	1·35
Carson City	77	20	44·1	1·63
Crane's Ranch	.....	.....	.....	1·54
Dayton	74	22	46·6	0·88
El Dorado	85	47	64·5	0·54
Elko (1) *	62	22	41·5	2·05
Elko (2)	84	12	31·6	0·92
Ely	68	20	41·6	0·94
Eureka	70	15	41·7	1·46
Ferguson's Ranch..	.....	.....	.....	0·33
Fort McDermitt	68	25	45·8	1·04
Genoa	69	24	45·0	4·45
Golconda *	75	25	46·8	0·40
Halleck *	70	26	43·7	0·55
Hawthorne *	74	30	50·4	0·00
Hot Springs (1) *	65	18	42·8	0·00
Hot Springs (2)	.....	.....	41·2	0·00
Humboldt *	70	28	48·5	0·50
Lewer's Ranch	73	20	44·6	2·80
Mill City	.....	.....	49·8	0·49
Montello *	70	30	46·4	0·57
Palisade *	72	24	45·2	0·70
Pioche	68	18	40·4	2·07
Reno *	80	26	49·2	0·95
Tecoma *	72	30	48·8	0·60
Toano *	70	32	46·7	0·50
Tuscarora	62	20	39·8	1·41
Verdi	.....	.....	43·4	2·98
Wellington	59	12	37·4	1·69
Winnemucca *	73	28	46·0	0·61
New Hampshire.				
Antrim	.....	.....	.....	2·72
Belmont	.....	.....	.....	2·90
Berlin Mills	60	0	30·4	3·00
Bristol	.....	.....	.....	2·29
Chesterfield	56	0	30·1	2·39
Concord	61	8	35·4	2·51
Hanover	53	8	31·6	2·65
Lake Village	.....	.....	.....	3·04
Manchester (1)	65	16	36·4	2·67
Manchester (2)	63	16	35·3	2·78
Manchester (3)	62	14	35·6	2·10
Mine Falls	.....	.....	.....	2·35
Nashua	65	13	36·3	2·17
North Chesterfield.	56	0	30·1	2·39
North Conway	61	8	33·6	1·42
North Sutton *	58	12	31·6	2·13
Pennichuck Sta	.....	.....	.....	2·22
Plymouth	59	— 2	32·0	2·24
Shaker Village	55	13	33·9	2·19
Stratford	63	5	33·4	2·48
Walpole	66	11	31·0	1·96
West Milan	62	— 6	29·0	2·06
Weir's Bridge	.....	.....	.....	2·69
Wolfborough	.....	.....	.....	3·06
New Jersey.				
Allaire	64	22	40·6	.....
Asbury Park	64	23	40·4	.....
Beverly †	67	25	40·5	3·63
Billingsport L. H.	64	29	41·9	.....
Bridgeton	64	32	43·6	6.49
Cape May C. H.	66	28	42·4	.....
Clayton	64	28	39·0	2·90
Egg Harbor City	64	25	42·0	5·65
Freehold	62	21	39·0	5·34
Gillette	61	22	39·4	2·96
Hanover	62	26	44·4	2·45
Highland Park	62	24	40·1	3·35
Hopewell	.....	.....	.....	2·55
Imlaystown	63	24	39·4	4·20
Jersey City	63	26	41·2	.....
Lambertville	63	28	40·7	3·37
Locktown	62	23	39·3	3·40
Madison	64	23	38·7	2·74
Moorestown	63	25	39·8	3·85
New Brunswick (1)	62	28	.....	3·23
New Brunswick (2)	64	25	40·2	3·00
New Brunswick (3)	64	24	40·2	.....
Newark	63	26	40·5	3·31
Ocean City	50	28	38·6	4·80
Oceanic	67	27	42·4	5·70
Paterson	64	19	40·7	.....
Plainfield	65	23	39·8	3·75
Princeton	62	24	40·0	1·98
Rancocas	64	24	.....	3·40
Readington	60	26	42·4	.....
Somerville	64	24	41·4	2·84
South Orange	63	22	39·0	3·88
Tenafly	70	19	38·5	3 49
Tom's River	66	20	39·2	5·15
Trenton	65	27	43·0	5·67
Union	61	25	39·1	3·30
New Mexico.				
Coolidge	68	24	32·1	0·60
Deming *	83	30	51·9	.....
Embudo	70	22	45·3	0·32
Fort Bayard	77	25	47·5	0·18
Fort Seldon	63	.....	.....	0·20
Fort Union	68	.....	.....	0·00
Fort Wingate	66	18	40·4	.....

Meterological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
New Mexico —Con.	°	°	°	*Ins.*
Gallinas Spring †	70	29	48.6	0.22
Las Vegas †	70	14	41·5	0.50
Lordsburg *	67	37	50·5	0.10
Springer †	.....	.....	.....	0.36
New York.				
Angelica †	59*	10	32.4	1.67
Ardenia *	64	25	39·5	1·76
Barnes' Corners *†	44	— 3	28.6	1·03
Boyd's Corners *..	68	23	39·3	1·86
Constableville †	47	6	29·0	1·21
Canton †	48*	10	29·6	0·91
Cooperstown *	55	17	31·4	1·76
Davids Island	.....	21	.....	2.09
Eden	45	18	32.8	1·30
Elmira † ‖	57	19	36·9	0.25
Factoryville †	60	18	34·7	1·55
Fleming *	.....	18	.....	.....
Fort Columbus	60	25	40·9	3·74
Fort Hamilton	61	20	40.4	3·36
Fort Niagara	55	20	35·2	0·73
Fort Porter	55	15	32.8	1·75
Fort Schuyler	61	24	39·6	2·70
Fort Wadsworth	65	24	40.6	3·74
Friendship *	71	16	35·7	4·85
Geneva	65*	17	34·4	1·04
Hess Road Sta* †	54	14	33·6	3·57
Humphrey * †	57	16	32·5	2·34
Ilion †	60*	17	32·7	2·30
Ithaca	60	18	34·0	1·70
Le Roy	60	15	33·2	1·27
Lowville *	52	12	33·3	.....
Lyons	61	19	34·2	2.10
Madison Barracks	57	10	30·4	0.70
Middleburgh†	62	7	35·0	1·50
Newfane Station *.	.....	14	31·1	.....
Nineveh *	75	8	31·0	1·65
North Hammond †.	60	10	31·4	.....
North Volney *	55	19	31·6	.....
Number Four †	51	5	28·9	2.41
Palermo †	50	13	31·8	2·59
Palmyra *	66	18	34·6	.....
Pendleton Centre *	.....	14	31·0	.....
Perry City *	60	14	31·7	1·93
Plattsburgh B'ks	52	14	33·0	0·30
Potsdam *	46	12	29·3	1·48
Queensbury * †	.....	16	31·6	1·53
Salem	59	9	34·0	?1·08
Saranac Lake †	53*	6	30·4	2.96
Savona †	60	11	33·1	1.20
Setauket	60	26	38·5	2.74
Somerset *	.....	10	31·6	1·80
South Canisteo *	60	14	35·2	.....
South Kortright *†	.....	20	32·0	1·38
Tannersville *g*	52	— 4	29·5	.....
Utica	60	14	33·6	2.48
Watervleit Arsenal	63	21	36·2	1·85
Wedgwood*	61	16	33·3	1·14
West Point	62	20	36·6	1·50
White Plains *	62	26	40·6	3·50
Willet's Point	62	27	39·6	2.20
North Carolina.				
Asheville (1) †	.....	.....	.....	1.28
Asheville (2)	73	21	45·4	0·43
Chapel Hill	74	27	47·4	2·33
Charleston †	.....	.....	.....	1·84
Hot Springs	76	27	47·5	.....
Lenoir *	67	27	47·6	1.40
Monroe †	73	28	49·0	2.74
Morganton † *	77	30	47·8	1.60
Mount Holly †	.....	.....	.....	2.00
Mount Pleasant	74	23	47·8	2.15
Murphy †	.....	.....	.....	2.35
New Berne	77	27	.....	2.90
Raleigh	73	30	49·0	2.40
Rock Spring *	79	28	46.6	.....
Salisbury	69	32	52.0	3.30
Soapstone Mount *.	.....	26	44.6	.....
Southern Pines †	76	36	52.4	3.65
Statesville	72	28	48.6	2.14
Wake Forest	72	25	46.7	3.23
Weldon †	74	24	46.0	3.87
Ohio.				
Akron	68	18	28.3	2.36
Ashland	.....	.....	.....	2.01
Athens	74	20	42.1	1.36
Bangorville	70	14	39·3	1.06
Bellevue *	70	20	36.6	2.80
Carrollton *	.....	22	37·4	1.28
Caledonia †	.....	.....	.....	0.81
Celina	74	20	42.4	0.90
Canton	69	20	39·2	1.38
Clarksville	74	18	42.3	0.71
Circleville	.....	.....	.....	0.69
Cleveland	64	20	37.8	2.30
College Hill	77	26	46.1	1.70
Collinwood *	70	21	35.5	2.31
Columbus Barracks	76	18	42.0	1.58
Dayton	73	17	42.3	0.98
Demos	68	24	41.8	1.17
Ellsworth	.....	.....	.....	2.47
Elyria	69	16	38.4	3.05
Fostoria	74	13	40.1	1.05
Gallipolis †	.....	.....	.....	1.70
Garrettsville	69	10	35·3	3.11
Gracey *	.....	26	40.0	1.30

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Ohio—Cont'd.	°	°	°	*Ins.*
Granville	72	18	40·5	1·07
Greenville	70	18	40·9	1·38
Hanging Rock	75	21	43·5	1.68
Hiram	64	14	30.0	2.82
Hudson	.....	.....	.....	2.76
Jacksonborough	74	20	42.6	0.40
Jefferson	66	15	35·1	2.00
Kent	75	18	33·3	2.82
Kenton *	78	13	39·0	0.91
Logan	78	17	41·3	1·52
Lordstown	70	11	37·3	2.18
Mansfield †	.....	.....	.....	0.88
Marietta (1)	74	23	43·3	1·09
Marietta (2) †	.....	.....	.....	1·99
McConnelsville	75	19	41·9	0·93
Napoleon †	68	12	40·7	2·09
New Alexandria	68	17	41·1	1·90
New Comerstown	70	15	39·8	0·95
North Lewisburgh.	72	17	42·1	0·75
Oberlin	66	14	36·1	3·19
O. S. University	.....	.....	.....	1.00
Ottawa	.....	.....	.....	1·81
Orangeville *	.....	6	33·0	2.60
Poland *	.....	14	36·0	.....
Pomeroy	75	24	46·3	0.71
Portsmouth (1)	82	25	44·9	1·37
Portsmouth (2) †	.....	.....	.....	1.68
Salineville *	.....	15	35·4	1·90
Sidney	72	19	42.0	1·01
Springborough	.....	.....	.....	0.87
Tiffin *	68	19	38.6	2.96
Upper Sandusky	70	16	40·1	1.28
Vienna *	.....	13	31·4	1.15
Wapakoneta	71	15	39·8	0·55
Wauseon	71	10	37·2	2.96
Waynesville	.....	.....	.....	2.53
Westerville	74	18	40.0	0.91
West Milton*	79	21	46.8	2.65
Weymouth	.....	.....	.....	2.47
Winfield *	78	18	39·8	1·31
Wooster	71	16	38·7	2.14
Yellow Springs	72	15	41·8	0·91
Youngstown	69	14	39·6	1.90
Zanesville †	.....	.....	.....	0.47
Oregon.				
Albany †	76	32	52.7	2.28
Ashland *	76	35	51·3	0·50
Bandon *	71	34	50.8	6.33
East Portland	75	32	.....	1.22
Eola *	70	33	51·7	2.84
Fort Klamath	70	15	41·4	.....
Grant's Pass †	82	29	52.1	3.40
McMinnville†	75	30	51·2	2.20
Mount Angel †	77	30	52·9	2 26
Parker †	.....	.....	.....	4·94
Siskiyou *	72	35	48.4	2.80
Tillamook *	88	30	51·7	5·24
Pennsylvania.				
Allegheny Arsenal.	72	23	43·7	2.40
Altoona	65	22	42·7	2.37
Aqueduct *	67	35	46.2	3·98
Brookville †	.....	.....	.....	2.30
Blooming Grove *	61	22	36.8	3.60
Carlisle	68	25	41·3	1·91
Catawissa	66	23	42.2	2.99
Charlesville	68	20	39.2	4.16
Clarion (1) †	.....	.....	.....	2.27
Clarion (2)	67	9	37·7	1·91
Costesville	67	21	39·8	4·49
Columbus	76	4	36·5	1·63
Confluence †	.....	.....	.....	1·98
Corry *	76	4	34·3	1·63
Drifton †	61	15	35·8	2.61
Dyberry †	59	11	33·3	1·74
Eagle's Mere	56	10	33·4	1·85
East Brook *	66	15	35·6	.....
Easton	.....	.....	.....	3.61
Edinborough *	60	13	34·3	.....
Emporium	65	11	40·0	1·44
Falls of Neshaminy	60	24	40·4	3·35
Frankford Arsenal.	65	25	41·1	3·69
Franklin *	64	10	38.2	1·56
Freeport †	.....	.....	.....	2.62
Germantown	65	23	39·2	3·28
Girardville	61	19	38.8	2·77
Grampian Hills	66	12	36.6	3·12
Greensborough †	.....	.....	.....	2.64
Hollidaysburgh	68	18	39·0	3·69
Honesdale	56	15	34·2	1·88
Huntingdon	65	19	38·9	3·17
Indiana	69	17	43.2	1·47
Johnstown †	.....	.....	.....	2.22
Lancaster	64	21	40·4	3·89
Lebanon	65	24	38·4	3·45
Le Roy*	60	13	33.8	1.63
Lock Haven	69	19	39·2	2.63
Lock No. 4 †	.....	.....	.....	2.56
Mahoning †	.....	.....	.....	1·45
McConnellsburgh	66	22	40.0	4·76
Meadville †	66	.....	.....	3.00
Meshoppen *	.....	28	43·7	.....
New Bloomfield	66	19	38·9	3·91
New Castle	69	9	45·3	2·73
Nisbet *	.....	26	38.6	1·45
Oil City†	.....	.....	.....	1·50

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Pennsylvania—Con.	°	°	°	*Ins.*
Parkers Landing†	.....	.....	.....	2.03
Petersburgh *	68	20	38.6	1.27
Philipsburgh †	67	13	37.4	2.27
Pleasant Mount *	.....	18	31.1	2.60
Pottstown	68	24	43.0	3.73
Quakertown	64	20	38.5	3.37
Reading†	69	20	41.6	3.72
Rimersburgh	70	12	38.0	.....
Salem Corners *	54	16	33.6	2.25
Saltsburgh †	.....	.....	.....	2.91
Selin's Grove	62	24	44.0	2.60
Somerset	65	9	35.3	2.52
State College	63	13	38.2	2.53
Swarthmore	65	24	40.3	3.43
Tuscarora *	65	27	42.8	3.57
Uniontown	68	11	41.5	3.60
Warren †	.....	.....	.....	0.77
Wellsborough	65	18	35.7	3.24
West Chester	64	22	40.5	3.44
Wysox	63	21	36.2	1.73
Rhode Island.				
Bristol	53	21	36.5	2.13
Kingston	.....	.....	.....	4.70
Lonsdale	.....	.....	.....	1.63
Newport	52	24	38.4	.....
Olneyville	70	22	39.8	.....
Providence	67	20	37.1	2.02
Woonsocket	62	20	37.0	1.70
South Carolina.				
Aiken	75	30	53.8	3.79
Belmont	74	30	52.0	3.12
Brewer Mine	76	26	51.0	4.41
Cedar Springs†	76	20	47.9	1.65
Clinton	70	33	51.7	2.49
Columbia (Ex. Sta.)	77	28	52.1	3.20
Conway	73	30	51.5	4.16
Florence	70	38	54.0	.....
Kirkwood *	.....	26	47.6	3.20
Spartanburgh	72	22	47.0	0.30
Statesburgh †	75	30	52.2	3.27
Timmonsville	70	44	57.0	5.42
Trial	72	29	50.5	5.33
Winnsborough	74	23	48.2	2.67
Yorkville	75	25	50.0	1.64
Tennessee.				
Andersonville	78	26	49.0	2.18
Ashwood * †	73	27	50.8	3.49
Austin †	78	27	50.2	2.98
Carthage †	.....	.....	.....	3.19
Charleston†	.....	.....	.....	2.37
Clinton †	.....	.....	.....	2.15
Cog Hill	76	18	44.3	2.57
Columbia †	.....	.....	.....	0.31
Covington	76	29	52.2	4.62
Clarksville	76	25	50.0	2.28
Fayetteville	76	28	51.5	2.62
Florence Station	73	29	49.8	4.17
Greeneville	72	26	45.9	2.18
Hohenwald	80	16	49.0	3.74
Jacksborough	74	25	48.0	3.10
Johnsonville †	.....	.....	.....	2.44
Kingston †	.....	.....	.....	2.98
Kingston Springs	79	21	48.3	2.50
Lawrenceburgh	77	17	46.8	3.79
Leeville	82	26	51.0	2.88
Lookout Mountain	74	22	49.6	3.25
Loudon †	.....	.....	.....	1.55
McKenzie	78	30	52.8	1.50
Milan	78	25	50.2	4.41
Nunnelly	79	19	49.6	3.64
Parksville	77	23	49.2	1.67
Riddleton	77	21	46.2	2.67
Rogersville	70	26	47.6	1.64
Rockwood †	.....	.....	.....	1.45
Springdale	80	24	48.6	2.03
Strawberry Pl'ns †	.....	.....	.....	3.52
Trenton	75	25	49.0	3.32
Watkins	80	30	49.6	2.38
Waynesborough	82	21	48.0	3.10
Texas.				
Austin (1)*	85	41	.....	.....
Austin (2)	80	40	59.2	0.88
Baird *	86	.....	.....	1.04
Brady †	81	35	54.0	1.40
Brazoria †	78*	40	58.4	2.82
Brownwood †	81	36	56.1	1.39
Brenham	83	44	61.2	3.92
Cedar Hill *	74	35	57.2	1.76
Camp Pena Colo	86	34	60.9	1.75
Cleburne	78	34	56.7	3.05
College Station	84	41	60.2	2.39
Columbia Station	78	45	60.8	3.71
Corsicana	87	36	59.0	3.38
Decatur †	83	31	54.8	0.90
Edinburgh †	.....	.....	.....	2.27
Forestburgh *	.....	36	54.0	0.18
Fort Bliss	85	31	53.4	0.62
Fort Brown	85	44	65.2	3.61
Fort Clark	84	28	53.9	1.61
Fort Concho	85	35	57.2	1.15
Fort Davis	78	28	50.1	0.35
Fort Elliott	78	23	50.0	1.32
Fort Hancock	89	18	52.3	0.80
Fort McIntosh	84	38	63.8	2.30

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Texas—Cont'd.	°	°	°	*Ins.*
Fort Ringgold	88	38	64.8	2.08
Fort Worth †	79*	35	55.9	2.81
Gallinas †	86	37	58.2	3.20
Granbury * †	86	30	51.5	1.76
Huntsville	80	40	58.5	3.41
La Grange †	.....	41	60.6	3.16
Lampasas † d	87	37	57.9	1.62
Howe *	78	32	54.7	3.95
Longview	83	35	58.3	2.65
Luling	85	40	59.4	4.87
Mesquite * †	88	34	56.7	4.11
Miami †	.....	.....	.....	1.32
New Ulm	83	42	59.9	4.13
New Braunfels †	78*	40	55.4	4.00
Pecos City †	85	33	51.9	1.56
Santa Maria †	.....	.....	.....	1.62
San Antonio	84	40	59.5	3.56
Silver Falls †	89	28	50.4	0.00
Snyder †	.....	34	.....	0.30
Victoria *	78	48	49.5	4.20
Waco	80	33	58.7	2.20
Utah.				
Corinne *	71	34	48.2	1.70
Fort Douglas	70	32	48.2	1.38
Fort DuChesne	71	15	41.8	0.32
Kelton *	73	32	46.7	1.26
Ogden *	74	30	46.5	1.15
Price †	.....	.....	.....	0.60
Promontory *	70	22	44.2	0.04
Terrace *	68	35	51.3	1.45
Vermont.				
Brattleborough (1).	63	10	35.8	1.24
Brattleborough (2).	62	13	36.1	.....
Burlington	52	13	33.4	2.35
Chelsea	.....	.....	.....	3.24
Cornwall	53	10	29.8	3.52
East Berkshire †	54	2	26.2	3.53
Jacksonville	59	6	32.8	2.02
Lunenburgh *	72	8	30.9	4.30
Saint Johnsbury	52*	— 2	28.0	0.70
Saxton's River	61	4	32.4	1.66
Strafford *	54	10	32.6	4.30
Vernon	62	14	36.4	.....
Virginia.				
Abingdon †	.....	.....	.....	1.26
Bird's Nest *	66	29	43.2	7.20
Bolar	.....	.....	.....	2.50
Christiansburgh †	63	22	39.8	1.74
Dale Enterprise †	72	26	46.6	2.08
Fort Monroe	70	31	43.8	5.69
Fort Myer	70	26	43.0	4.80
Marion †	72	22	41.6	1.52
Petersburgh †	65	29	43.1	5.29
Smithfield *	74	28	44.2	8.13
Spottsville	72	30	43.8	5.62
University of Va	.....	.....	.....	1.92
Wytheville	73	24	43.8	1.37
Summit	67	21	40.5	.....
Washington Territory				
Blakeley	67	32	49.3	4.08
Fort Spokane	70	23	52.0	1.96
Fort Townsend	65	32	49.4	1.42
Fort Walla Walla	72	30	52.1	1.06
Vancouver B'ks	72	28	50.3	2.28
West Indies.				
Grand Turk Isl'd ‡	84	79	82.7	0.50
Hamilton, Bermuda	71	53	63.5	4.65
West Virginia.				
Buckhannon †	.....	.....	.....	2.19
Charleston †	.....	.....	.....	1.97
Glenville †	.....	.....	.....	1.49
Hartmonsville *	68	18	35.5	.....
Hinton †	.....	.....	.....	1.04
Middlebrook *	61	11	34.7	72.25
Morgantown †	.....	.....	.....	3.09
Rockport	75	25	41.7	2.60
Rowlesburgh †	.....	.....	.....	0.95
Tyler Creek	75	30	41.8	1.80
Wheeling †	.....	.....	.....	1.31
White Sulph. Sp'gs †	.....	.....	.....	1.57
Weston †	.....	.....	.....	1.54
Wisconsin.				
Cadiz *	.....	20	36.0	.....
Chippewa Falls †	.....	.....	.....	0.38
Delevan	69	13	36.3	1.36
Embarrass *	65	12	35.8	0.90
Fond du Lac	64	16	35.0	0.47
Fredonia *	64	23	34.2	0.20
Glasgow †	.....	23	35.6	.....
Hayward * d	62	— 2	29.8	70.80
Lincoln *	.....	20	34.6	0.34
Madison	.....	19	37.1	1.48
Manitowoc	63	17	37.5	0.53
Neillsville *	66	10	33.2	.....
Oshkosh †	61	16	35.0	0.68
Portage †	.....	.....	.....	1.19
Richland Centre * †	.....	24	36.2	0.63
Rhinelander	.....	.....	.....	0.00
Wauconsta †	.....	11	31.9	0.35
Weston *	.....	18	32.2	1.24
Viroqua *	.....	15	32.2	?
Summit Lake *	76	10	28.2	.....

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Wyoming.	°	°	°	*Ins.*
Camp Sheridan	57	12	36.1	0.53
Camp Pilot Butte	66	9	37.2	0.16
Carter †	.....	.....	.....	0.20
Fort Bridger	62	10	36.2	.....
Fort D. A. Russell	57	7	30.0	T.
Fort Laramie	72	14	42.0	T.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Wyoming—Cont'd.	°	°	°	*Ins.*
Fort McKinney	63	12	42.0	0.07
Fort Washakie	65	8	38.6	0.06
Sweetwater Bridge †	.....	.....	.....	0.00
Canada.				
McGill Col. (Montreal.)	44	8	2.87	2.11

Reports received too late for publication in the February Weather Review.

Arizona.	°	°	°	*Ins.*
Yuma	73	41	57.5	0.00
California.				
Edgewood *	58	11	36.9	.....
Fresno *	...	30	65.1	?
Girard *	75	26	49.3	1.00
Livingston *	71	29	52.3	0.40
Orland *	80	28	55.6	0.58
Pleasanton *	77	26	51.0	0.48
Rumsey *	68	30	48.9	1.35
Sims *	70	30	41.9	?
Sisson *	63	13	38.4	0.20
Truckee *	54	— 8	31.5	?
Canada.				
McGill College	40	—23	10.6	3.33
Dakota.				
Brookings	43	—30	9.5	.....
Parkston *	54	—28	14.5	0.75

Iowa.	°	°	°	*Ins.*
Albion	46	—16	17.1	0.15
Humboldt *	44	—21	11.8	0.34
Kansas.				
Emporia	68	— 5	29.7	1.25
Nevada.				
Fenelon	52	— 6	25.9	.....
New York.				
Fort Schuyler	49	0	26.1	1.66
Oregon.				
Ashland	67	24	44.3	?
Texas.				
Miami	.....	.....	.....	1.02
South America.				
Burnside, Surinam	88	71	79.5	1.30
West Indies.				
Port au Prince	93	64	77.7	0.84

NOTE.—The letters of the alphabet denote number of days missing in record.
* Maximum and minimum from observed readings. † Readings from Signal Service instruments. ‡ Mean temperature from one observation taken at 10 a. m.

Correction: precipitation at Mount Huachuca, for February, 1889, should be 0.34 instead of 0.05.

NOTES AND EXTRACTS.

The following circular issued by the Hydrographic Office, U. S. Navy, is republished by request of the Hydrographer:

The recent wrecks and loss of life in the harbor of Apia, Samoan Islands, have strongly emphasized the importance of collecting and publishing as much information as possible relative to the meteorology of the Pacific Ocean. It is the intention of this office to commence the publication, at an early date, of a monthly Pilot Chart of the north and south Pacific Oceans, similar in its general plan to the Pilot Chart of the north Atlantic Ocean, issued by this office. It is earnestly requested that reliable information relative to hurricanes in the Pacific, especially the one about Samoa, March 15th and 16th, be forwarded to this office, to one of its branch offices, or to any U. S. Consul, for transmission to Washington. Officers in charge of branch Hydrographic Offices will give this circular as wide publicity as possible, and make every effort to collect data.

Monthly and annual mean temperatures at Philadelphia, Pa., from observations furnished by Mr. Lorin Blodget.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1851	.....	.....	.....	.....	.....	.....	78.6	74.2	68.9	58.5	43.5	30.2	.....
1852	26.5	33.8	41.2	47.3	64.3	72.9	78.0	74.1	67.3	58.9	42.5	41.7	54.0
1853	33.2	37.8	42.8	53.4	64.3	75.3	76.6	75.7	68.5	53.9	48.4	35.3	55.4
1854	32.9	34.8	43.1	51.4	65.4	73.1	80.4	76.6	70.2	59.1	46.1	31.3	55.9
1855	34.3	26.7	38.8	52.9	63.8	71.9	79.7	75.0	70.2	55.2	48.2	37.5	54.3
1856	23.6	26.7	33.4	54.5	62.7	(76.0)	80.1	72.1	66.2	53.4	43.2	30.1	52.0
1857	20.9	39.9	38.0	45.4	61.2	71.3	77.3	75.3	69.2	56.2	45.9	41.0	53.4
1858	40.8	30.1	40.7	52.5	59.3	77.5	79.2	75.0	67.9	56.8	42.2	37.6	55.0
1859	30.8	36.4	48.1	50.3	64.6	70.6	76.0	74.5	66.2	52.3	47.5	33.0	53.6
1860	33.4	32.3	44.7	49.5	64.1	71.7	76.9	75.4	65.8	56.8	46.4	33.3	54.1
1861	31.0	39.5	42.7	52.9	59.4	73.1	76.1	73.2	67.9	59.9	43.9	36.9	54.7
1862	31.9	32.0	39.2	49.4	63.1	68.7	75.6	76.5	69.0	58.0	44.0	35.6	53.6
1863	37.2	34.1	36.4	48.6	64.6	66.8	77.0	74.8	65.6	55.3	47.1	34.9	53.6
1864	33.2	35.3	39.5	49.6	67.0	71.9	77.6	79.3	66.8	54.2	45.0	35.8	54.6
1865	26.5	32.4	46.9	55.2	63.4	77.3	78.3	75.9	74.0	55.9	45.2	37.7	55.8
1866	30.3	35.2	41.2	55.5	61.5	73.7	80.7	72.5	69.7	56.8	47.4	34.3	54.9
1867	26.3	40.0	37.6	53.2	58.5	71.5	76.1	74.6	67.8	56.7	47.0	31.7	53.4
1868	30.3	26.6	40.9	47.2	58.3	71.9	81.6	77.5	67.9	53.4	45.9	32.6	52.8
1869	36.7	37.6	38.9	53.1	60.4	73.3	76.3	75.3	68.6	51.6	41.3	37.7	54.2
1870	40.5	34.8	37.9	52.5	63.8	76.4	80.1	78.1	70.1	59.3	46.9	36.8	56.4
1871	32.6	34.3	47.6	56.6	65.2	73.0	75.6	77.2	63.0	57.7	43.1	33.0	54.9
1872	32.3	33.8	34.2	54.0	67.6	75.6	81.1	79.1	69.6	56.6	44.4	29.8	54.8
1873	31.5	32.1	39.7	50.6	62.7	75.2	80.7	76.2	69.4	57.6	40.2	39.8	54.6
1874	38.7	35.6	43.8	45.7	63.4	77.2	80.0	76.2	72.3	59.7	48.4	38.3	53.5
1875	29.4	29.6	38.6	49.8	65.3	75.0	79.2	77.2	68.6	57.2	43.0	37.9	54.2
1876	40.6	37.2	40.2	52.4	64.5	78.4	83.2	78.6	67.8	54.7	48.7	28.7	56.2
1877	31.7	40.2	41.6	53.4	64.5	76.1	80.5	79.7	71.2	61.0	50.6	43.9	57.9
1878	36.4	40.4	49.6	59.3	64.3	71.2	81.7	78.0	72.8	61.2	51.9	38.3	58.6
1879	31.9	33.0	44.3	52.0	67.1	76.3	80.0	76.9	68.0	66.0	51.1	44.4	57.6
1880	45.7	42.8	43.2	54.7	72.5	77.6	79.8	77.3	71.9	59.5	45.5	31.2	58.5
1881	29.3	33.8	41.4	51.8	68.0	71.4	80.6	79.7	79.0	64.6	50.8	45.3	58.0
Mean	32.8	34.6	41.2	51.8	63.8	73.8	78.8	76.3	69.1	57.4	46.0	35.9	55.0

Table of miscellaneous meteorological data for March, 1889—Signal Service observations.

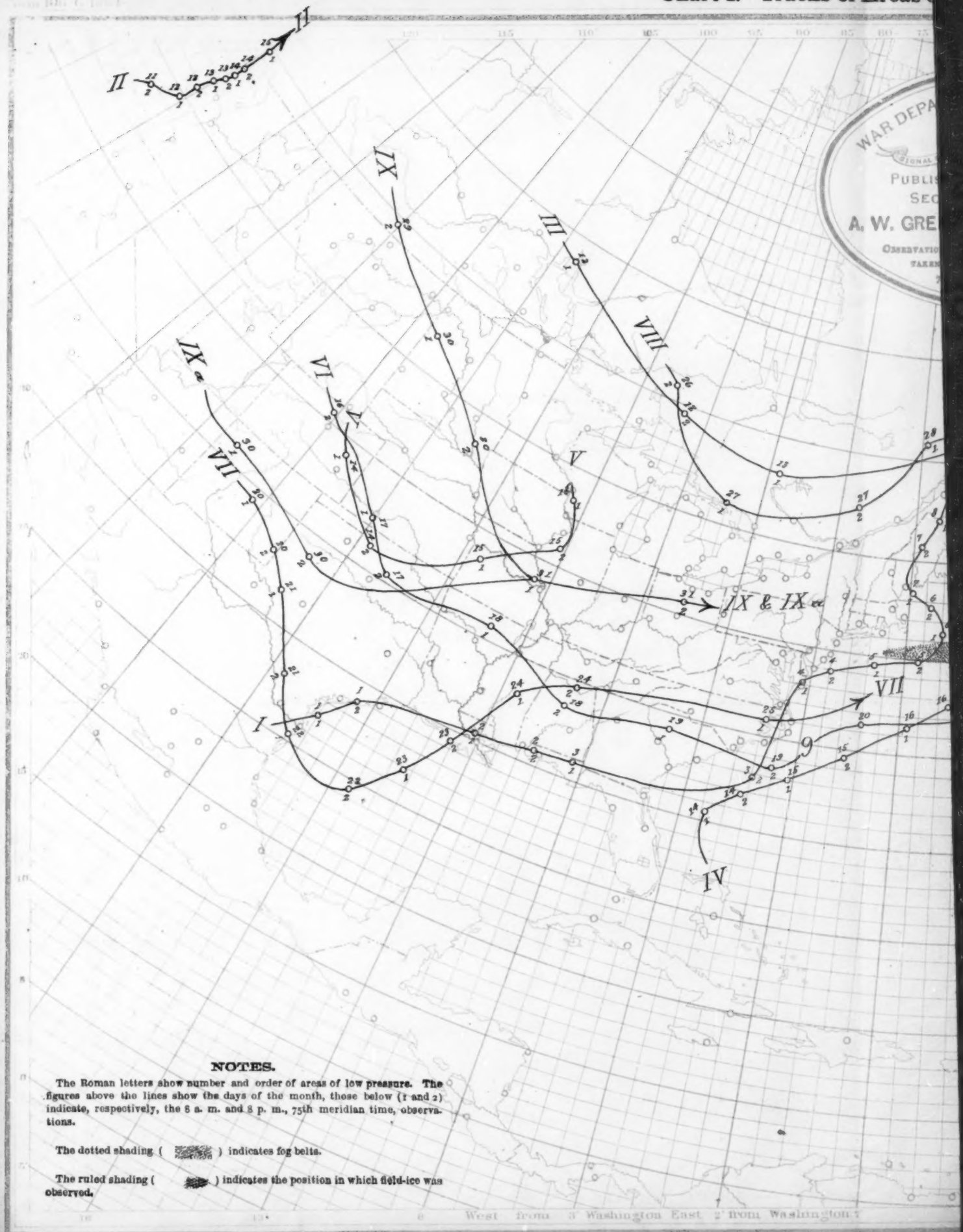
Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches.			Temperature of air, in degrees Fahrenheit.							Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.		Wind.				Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.		Temper'ture data since opening of station.				
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.			Departure from normal precipitation.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				8 a. m.	8 p. m.	Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.
New England.					3.68	+ 4.5								2.77	— 1.69														
Eastport	53	29.78	29.84	1.53	33.0	+ 6.0	54	38.6	15	27.5	22	2	25.8	77.3	4.06	— 0.95	9,033	ne.	48	e.	6	6	8	17	11	5.8	4.8	16	54	1889	— 8	1886
Portland	99	29.74	29.85	1.70	34.6	+ 2.6	60	41.1	16	28.2	25	4	24.6	71.1	2.68	— 0.55	6,790	n.	32	ne.	21	7	9	15	11	6.9	4.8	18	65	1874	— 7	1872
Manchester	247	29.61	29.88	1.57	35.6	.....	62	43.9	14	27.4	34	4	22.8	65.6	2.10	.....	5,838	nw.	26	nw.	30	8	10	13	9	6.6	5.3	3	62	1889	— 4	1887
Northfield	871	28.92	29.90	1.90	29.5	.....	55	38.4	8	20.6	40	4	21.9	78.1	2.05	.....	6,149	s.	45	n.	14	4	10	17	11	6.9	5.7	3	55	1889	— 15	1887
Boston	125	29.74	29.88	1.53	38.2	+ 5.2	64	44.3	22	32.1	27	3	26.6	67.7	†	.....	10,665	w.	46	ne.	16	7	10	14	9	6.9	5.6	19	72	1880	— 8	1872
Nantucket	14	29.83	29.84	1.45	36.4	.....	52	40.8	26	32.1	20	2	33.2	88.5	5.46	.....	11,352	*	54	ne.	16	11	7	13	12	5.0	5.0	3	54	1888	6	1887
Wood's Holl	22	29.85	29.87	1.47	36.2	.....	52	40.8	25	31.6	19	2	29.9	81.8	2.87	— 1.83	13,059	ne.	48	nw.	7	9	8	14	11	5.9	5.1	12	58	1880	5	1875
Vineyard Haven	.....	.....	.....	.....	38.6	.....	58	44.9	22	32.3	23	5	.....	.....	1.90	.....	.....	ne.	.....	.....	.....	14	4	13	10	...	...	3	58	*	12	1888
Block Island	26	29.84	29.87	1.42	37.2	+ 2.2	49	41.6	24	32.8	14	3	31.2	81.1	2.30	— 1.81	17,448	ne.	72	ne.	16	11	5	15	13	6.0	5.1	9	56	1886	6	1886
Narragansett Pier	22	.....	.....	.....	36.8	+ 4.8	56	44.2	13	29.5	27	5	.....	.....	3.66	— 0.73	.....	ne.	.....	.....	.....	9	9	13	12	...	...	7	60	1884	4	*
New Haven	107	29.77	29.89	1.37	38.7	+ 5.7	62	46.3	22	31.1	27	8	28.6	74.0	1.44	— 3.46	8,264	ne.	45	ne.	16	8	9	14	13	6.0	6.2	17	69	1880	0	1885
New London	47	29.81	29.86	1.40	39.2	+ 5.2	59	45.9	24	32.6	25	5	30.6	74.8	2.37	— 2.49	7,129	nw.	30	n.	16	10	7	14	13	6.4	5.7	17	64	1878	4	1884
Mid. Atlantic States.					42.4	+ 2.6									4.20	+ 0.22															
Albany	85	29.82	29.92	1.40	36.6	+ 4.6	65	43.9	19	29.3	32	5	29.2	80.6	1.76	— 1.19	5,092	nw.	26	*	*	5	11	15	14	7.5	5.8	16	67	1886	— 6	1885
New York City	185	29.71	29.91	1.30	41.5	+ 5.5	62	48.3	25	34.7	24	4	30.2	70.2	4.09	+ 0.13	9,122	w.	49	sw.	9	2	14	15	11	6.4	5.7	18	72	1879	3	1872
Harrisburg	361	29.56	29.96	1.13	40.8	.....	62	47.7	23	34.0	28	4	32.2	75.4	3.26	.....	7,458	nw.	34	nw.	9	7	9	15	9	6.7	5.7	.....	.....	.....	.....	.....
Philadelphia	117	29.80	29.93	1.17	42.2	+ 3.2	66	49.4	25	35.1	31	5	36.0	67.4	2.58	— 0.52	10,454	nw.	42	ne.	4	11	5	15	12	5.3	5.0	19	75	1880	5	1872
Atlantic City	34	29.88	29.91	1.24	38.8	+ 1.8	60	44.5	27	33.2	24	2	32.4	77.8	4.58	+ 0.79	9,916	ne.	36	ne.	16	11	7	13	11	5.2	4.0	16	72	1880	8	1884
Baltimore	76	29.86	29.95	1.10	43.4	+ 2.4	68	50.7	26	36.0	33	2	30.0	62.8	5.71	+ 1.71	5,336	nw.	25	ne.	4	7	14	10	13	6.4	5.6	17	76	1880	5	1873
Washington City	112	29.82	29.94	1.07	43.4	+ 3.4	70	51.7	29	35.1	34	4	31.6	68.2	4.20	— 0.03	5,941	nw.	29	nw.	30	12	9	10	14	5.9	5.0	19	79	1880	4	1873
Cape Henry	.....	.....	.....	.....	44.4	— 0.6	70	51.1	31	37.7	30	4	.....	.....	4.96	— 0.45	.....	nw.	.....	.....	.....	7	11	13	11	...	...	16	83	1879	12	1883
Lynchburgh	658	29.25	29.96	0.98	46.7	+ 1.7	77	56.2	28	37.2	41	3	35.8	72.6	2.44	— 1.53	4,463	nw.	24	*	*	4	16	11	11	5.5	4.9	16	81	1887	16	1884
Norfolk	69	29.86	29.93	1.08	45.0	— 2.0	70	52.4	29	37.5	35	2	35.4	76.2	7.52	+ 3.08	8,093	nw.	35	ne.	*	7	12	12	11	6.3	4.7	19	81	1880	14	1888
S. Atlantic States.					52.5	— 1.6									4.03	— 0.72															
Charlotte	808	29.11	29.97	1.00	51.0	+ 1.0	75	61.7	28	40.3	34	8	39.3	73.7	1.62	— 3.62	4,491	w.	23	ne.	15	13	7	11	8	5.2	2.9	11	80	1887	20	1888
Hatteras	11	29.92	29.94	1.13	47.1	— 1.9	63	52.3	35	41.9	23	3	41.2	81.8	5.43	— 1.31	11,904	nw.	56	n.	*	13	7	11	9	4.5	4.4	9	70	1884	26	1888
Kitty Hawk	.....	.....	.....	.....	47.0	0.0	74	55.4	30	38.6	30	6	.....	.....	3.52	— 2.40	.....	n.	.....	.....	.....	5	15	11	10	...	...	15	80	1880	30	1876
Raleigh	375	29.35	29.96	1.00	47.2	.....	74	56.5	27	38.0	34	6	37.5	74.6	2.72	.....	5,065	nw.	30	n.	15	11	10	10	9	5.2	4.1	3	77	1887	20	1888
Southport	.....	.....	.....	.....	50.2	— 1.8	70	57.5	29	42.8	23	7	.....	.....	5.01	+ 0.94	.....	ne.	.....	.....	.....	14	6	11	9	...	...	14	75	1888	21	1876
Wilmington	52	29.88	29.94	1.09	51.9	— 2.1	72	59.8	33	44.0	30	3	41.6	74.8	5.57	+ 1.33	5,232	n.	26	ne.	14	14	5	12	11	4.5	3.7	19	84	1878	30	1873
Charleston	52	29.90	29.95	1.05	55.0	— 2.0	74	62.4	34	47.5	22	4	46.0	80.0	7.49	+ 3.55	5,355	n.	34	ne.	14	13	8	10	12	4.8	4.8	16	84	1882	28	1876
Columbia	.....	.....	.....	.....	54.1	.....	77	64.0	30	44.3	30	6	.....	.....	2.44	.....	.....	w.	.....	.....	.....	13	6	12	8	...	...	2	77	*	24	1888
Augusta	183	29.80	29.99	1.02	54.8	— 1.2	80	65.0	31	44.6	35	4	43.4	73.6	2.72	— 2.73	3,479	w.	30	n.	14	14	9	8	7	4.3	4.9	17	89	1882	22	1873
Savannah	87	29.87	29.96	0.99	56.3	— 2.7	77	65.0	34	47.6	30	4	44.8	73.7	3.52	— 0.20	6,470	nw.	46	nw.	14	15	8	8	9	4.7	3.5	19	87	1882	27	1873
Jacksonville	43	29.94	29.99	0.87	59.1	— 3.9	81	68.4	39	49.8	28	7	50.9	80.4	1.38	— 2.01	4,531	w.	28	*	*	16	6	9	8	3.8	3.5	18	88	1882	31	*
Florida Peninsula.					64.8	— 3.2									4.48	+ 2.16															
Cedar Keys	22	29.98	30.00	0.76	60.1	— 2.9	75	65.2	42	55.0	19	5	52.6	81.0	2.07	— 1.77	8,208	n.	35	s.	18	18	6	7	10	3.6	2.8	10	82	1882	36	1886
Jupiter	28	29.96	29.99	0.67	64.8	.....	78	72.5	49	57.0	22	9	58.2	80.8	2.00	.....	6,658	w.	24	*	*	19	6	6	5	3.5	3.3	2	83	1888	45	1888
Key West	22	30.00	30.02	0.54	69.4	— 3.6	79	73.4	60	65.4	14	3	60.8	74.6	6.89	+ 6.10	8,053	*	36	nw.	6	15	9	7	11	4.3	3.3	19	89	*	53	*
Micco	.....	.....	.....	.....	63.4	.....	78	72.0	47	54.8	26	7	.....	.....	0.73	.....	.....	nw.	.....	.....	.....	16	6	7	7	...	...	.....	.....	.....	.....	.....
Titusville	12	30.00	30.01	0.76	61.5	.....	82	69.6	41	53.4	30	8	53.9	80.0	1.57	.....	5,782	w.	35	se.	24	18	7	6	7	4.1	3.0	2	87	1888	41	*
Eastern Gulf States.					67.6	— 1.0									4.32	— 2.23															
Atlanta	1,129	28.78	29.98	0.87	52.0	0.0	78	61.4	28	42.7	27	5	37.2	65.6	2.49	— 4.36	7,655	nw.	32	nw.	6	18	7	6	4	3.6	3.8	11	81	1882	20	1885
Pensacola	56	29.93	29.99	0.80	58.8	— 1.2	76	66.4	37	51.1	26	4	49.5	76.4	5.09	+ 0.33	7,919	nw.	42	se.	24	15	12	4	6	4.3	3.1	10	83	1884	31	1885
Auburn	.....	.....	.....	.....	54.0	.....	76	64.8	30	45.0	28	6	.....	.....	2.81	.....	.....	nw.	.....	.....	.....	11	10	10	5	...	...	2	78	1888	28	1888
Mobile	35	29.98	30.02	0.86	58.6	— 1.4	77	67.9	38	49.4	29	4	47.8	75.2	3.48	— 4.42	6,407	nw.	36	sw.	24	9	15	7	5	4.3	3.7	19	85	1879	29	1885
Montgomery	217	29.76	29.99	0.89	57.0	— 1.0	82	67.5	33	46.5	33	7	40.6	63.1	2.95	— 3.51	4,207	nw.	28	nw.	5	14	10	7	8	3.6	4.3	17	88	1882	28	1873
Vicksburg	222	29.76	30.00	0.90	57.6	— 1.4	80	67.4	36	47.7	33	4	40.9	61.6	7.02	+ 0.61	4,935	*	35	se.	17	11	9	11	9	4.5	4.8	17	84	*	27	*
University	.....	.....	.....	.....	53.6	.....	80	63.4	29	43.9	31	5	.....	.....	3.04	.....	.....	nw.	.....	.....	.....	7	18	6	7	...	...	2	80	1889	28	1888
New Orleans	52	29.95	30.01	0.78	62.0	— 1.0	79	69.2	44	52.8	24	3	51.8	79.8	3.86	— 2.15	6,788	*	35	sw.	18	10	8	7	5	2.9	3.5	19	84	1879	36	1885
Port Eads	.....	.....	.....	.....	60.2	.....	74	67.0	43	53.4	27	7	.....	.....	5.46	.....	.....	ne.	.....	.....	.....	10	9	12	5	...	...	.....	.....	.....	.....	.....
Western Gulf States.					67.9	— 1.1									4.22	+ 0.70															
Shreveport	249	29.74	30.00	0.98	58.6	— 0.4	83	67.8	39	49.5	32	4	43.1	63.7	3.05	— 1.87	5,566	ne.	36	nw.	18	16	8	7	10	4.8	4.0	16	90	1882	26	1876
Port Smith	470	29.52	30.03	1.04	53.2	+ 2.2	83	64.1	26	42.3	38	4	38.8	67.5	4.53	+ 2.40	3,907	ne.	23	ne.	28	15	7	9	14	4.2	4.5	7	84	1888	23	1888
Little Rock	309	29.68	30.01	1.00	54.3	+ 0.3	79	64.0	31	44.6	34	2	39.7	65.3	6.17	+ 1.50	4,885	nw.	24	*	*	12	13	6	9	4.4	4.1	10	83	1882	23	1886
Corpus Christi	20	30.01	30.03	0.60	61.3	— 2.7	81	67.1	45	55.5	26	4	55.4	83.2	3.24	.....	8,828	se.	37	w.	18	9	11	11	9	5.0	4.6	3	90	1887	41	1888
Galveston	44	29.99	30.03	0.72	60.0	— 3.0	73	65.1	45	54.8	18	2	52.2	81.2	3.31	+ 0.25	8,263	*	35	nw.	18	15	5	11	8	4.5	3.9	18	85	1879	34	1875
Palestine	511	29.47	30.00	0.89	58.6	— 1.4	82	69.3	38	47.9	41	7	47.0	71.1	4.53	+ 0.37	5,140	s.	27	nw.	18	11	9	11	9	5.2	4.1	8	85	1887	27	1886
San Antonio	781	29.22	30.05	0.69	59.4	— 2.6	84	68.8	40	50.0	30	6	45.8	69.7	3.74	+ 1.54	6,735	n.	36	nw.	27	10	8	13	7	6.4	5.7	11	93	1887	27	1880
Rio Grande Valley.					65.0	— 4.0									2.88	+ 1.56															
Brownsville	57	29.97	30.03	0.55	65.6	— 2.4	85	72.8	47	58.4	28	4	58.6	86.4	3.61	+ 2.16	6,658	s.	34	s.	31	13	10	8	8	5.0	4.9	14	92	1884	35	1880
Rio Grande City	230	29.84	30.08	0.60	64.5	— 5.5	84	74.1	44	54.9	38	2	55.2	81.2	2.16	+ 0.94	4,562	n.	24	*	*	11	9	11	8	5.4	4.5	12	98	1884	32	1884
Ohio Val. & Tenn.					47.6	+ 2.8									2.25	— 2.30															
Chattanooga	783	29.16	30.00	0.87	51.6	+ 0.6	80	62.4	26	40.7	35	4	37.7	65.1	3.71	— 3.08	4,648	nw.	26	nw.	28	15	8	8	7	4.0	2.7	11	82	1882	20	1885
Knoxville	980	28.97	30.02	0.88	48.6	+ 0.6	77	57.8	26	39.4	34	2	34.4	66.0	2.08	— 3.78	4,192	ne.	30	w.	27	8	13	10	9	4.5	3.6	19	83	1882	6	1873
Memphis	349	29.66	30.04	0.90	54.0	+ 2.0	80	63.1	33	44.9	31	4	36.3	59.3	5.33	— 0.34	5,360	nw.	30	w.	27	18	8	5	5	4.1	2.8	17	84	1879	18	1876
Nashville	549	29.41	30.00	0.79	50.4	+ 1.4	78	60.5	26	40.3	33	3	36.0	66.2	2.47	— 2.72	4,685	nw.	32	w.	31	8	16	7	9	4.7	4.3	19	82	1882	11	1873
Lexington	.....	28.88	.....	0.76	45.8	.....	75	53.9	24	37.6	33	3	31.8	64.4	1.63	.....	8,816	nw.	62	sw.	31	10	9	12	11	5.7	5.8	2	75	1889	13	1888
Louisville	551	29.41	30.00	0.78	48.2	+ 3.2	76	58.4	24	37.9	32	11	36.3	67.0	0.95	— 3.10	5,885	n.	40	sw.	31	10	14	7	8	4.9	4.9	17	79	1887	3	1873
Indianapolis	766	29.17	30.00	0.70	44.4	+ 5.4	71	53.1	22	35.6	38	4	30.6	66.2	2.15	— 1.66	4,507	nw.	24	n.	19	6	14	11	8	4.5	5.0	15	77	1875	3	1885
Terre Haute	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	...	2	67	1888	8	1888
Cincinnati	628	29.32	30.00	0.78	45.8	+ 2.8	76	54.8	25	36.7	32	6	31.4	62.7	0.61	— 2.89	5,123	nw.	44	sw.	31	6	10	15	15	4.5	4.6	1	19	1875	1	1873
Columbus	812	29.12	30.00	0.86	42.2	+ 4.2	74	51.2	21	33.1	32	4	28.6	66.8	0.66	— 2.59	6,077	nw.	40	sw.	31	12	11	8	10	4.5	4.7	11	74	1889	1	1885
Pittsburgh	847	29.03	29.94	0.89	43.2	+ 5.2	70	51.3	23	35.1	36	5	29.6	68.5	2.32	— 0.53	3,709	nw.	36	w.	31	6	10	15	15	6.3	5.7	16	80	1876	2	1877
Parkersburgh	638	29.30	30.01	0.87	43.2	.....	74	52.4	24	33.9	41	3	34.6	78.0	1.66	.....	4,410	*	29	w.	6	10	9	12	9	5.7	5.7	.....	.....	.....	.....	.....
Lower Lake Region.					35.4	+ 3.8									1.59	— 1.16															
Buffalo	690	29.21	29.97	1.04	33.4	+ 4.4	54	38.7	14	28.2	23	1	26.3	78.6	1.34	— 1.46	7,853	sw.	40	sw.	29	4	18	9	11	5.7	5.3	17	72	1875	— 4	1885
Oswego	335	29.56	29.94	1.24	31.6	+ 2.6	58	36.5	20	26.8	26	3	24.6	75.8	0.55	— 2.36	7,574	nw.	36	nw.	9	6	7	18	9	7.5	5.8	19	68	1886	—11	1872
Rochester	621	29.28	29.96	1.15	34.0	+ 5.0	61	40.4	17	27.6	25	5	25.0	75.4	1.78	— 1.26	5,239	nw.	30	w.	27	4	13	14	9	6.3	5.5	18	69	1875	— 7	1872
Erie	714	29.19	29.98	0.95	34.8	+ 2.8	58	40.5	20	29.0	24	3	26.8	77.9	1.73	— 1.27	7,820	*	35	s.	15	11	12	8	10	5.9	3.9	16	78	1875	— 1	1886
Cleveland	678	29.24	29.99	0.86	37.4	+ 5.4	64	44.1	22	30.8	32	2	27.6	72.8	2.07	— 0.82	5,562	nw.	24	w.	9	9	10	12	9	5.6	5.1	17	75	1875	— 4	1885
Sandusky	629	29.30	29.99	0.86	36.8	+ 2.8	64	42.8	21	30.9	32	2	27.0	73.4	2.23	— 0.39	7,007	nw.	30	nw.	10	1	17	13	9	6.9	4.6	12	76	1886	— 3	1885
Toledo	673	29.27	30.00	0.82	38.2	+ 3.2	68	45.9	18	30.6	32	6	27.5	72.8	1.87	— 0.31	7,307	nw.	27	nw.	9	9	6	16	9	6.7	6.0	19	75	1875	— 3	1873
Detroit	662	29.27	30.00	0.86	37.4	+ 4.4	65	45.0	17	29.9	29	3	26.6	72.4	1.17	— 1.38	7,270	nw.	29	nw.	27	7	13	11	6	6.2	5.4	19	75	1875	— 7	1872
Upper Lake Region.					34.0	+ 7.7									0.88	— 1.35															
Alpena	609	29.31	29.99	0.77	31.4	+ 9.4	56	37.7	12	25.0	26	2	24.1	78.2	0.21	— 1.96	7,466	nw.	36	w.	13	5	11	15	6	6.8	5.0	17	66	1879	—19	1884
Escanaba	608	.....	.....	.....	31.6	+10.6	52	40.6	15	22.6	30	7	.....	.....	0.48	— 1.31	.....	n.	.....	.....	.....	6	12	13	4	...	...	15	57	1879	—27	1884
Grand Haven	620	29.32	30.00	0.70	35.4	+ 5.4	69	41.8	17	29.1	34	3	26.8	75.6	0.40	— 2.03	7,940	ne.	28	*	*	8	15	8	6	4.5	5.5	17	71	1878	— 5	1885
Lansing	883	29.05	30.04	0.78	37.0	.....	65	45.8	11	28.3	32	5	29.6	85.4	1.13	.....	5,758	nw.	24	*	*	11	16	4	5	5.6	4.1	3	70	1888	2	1888
Manistee	615	29.32	30.02	0.66	33.1	.....	65	39.2	14	27.0	26	2	24.8	72.1	0.06	.....	5,685	n.	28	sw.	13	6	11	14	2	6.3	5.3	.....	.....	.....	.....	.....
Marquette	672	29.26	30.02	0.73	31.1	+10.1	62	38.2	8	24.0	31	3	23.4	77.8	1.02	— 0.44	6,535	nw.	42	nw.	13	5	11	15	15	6.5	6.0	15	70	1878	—16	1884
Port Huron	639	29.30	30.01	0.85	34.2	+ 6.2	63	40.9	14	27.4	30	3	24.8	74.0	0.73	— 2.52	7,996	n.	30	n.	13	11	6	14	4	5.9	6.2	15	72	1885	—14	1885
Sault de Ste. Marie	642	29.27	29.99	0.71	28.7	.....	55	36.1	8	21.3	29	4	22.3	82.9	0.31	.....	5,594	nw.	34	nw.	13	0	14	17	12	6.9	6.2	.....	.....	.....	.....	.....
Chicago	715	29.24	30.02	0.67	38.4	+ 3.4	68	44.7	20	32.1	30	2	29.3	76.2	1.43	— 1.22	7,965	*	40	n.	18	9	15	7	5	5.0	4.2	17	73	1875	—12	1873
Milwaukee	697	29.24	30.01	0.67	36.6	+ 6.6	63	42.9	20	30.2	25	3	27.0	73.1	1.07	— 1.52	7,986	n.	34	n.	18	10	11	10	6	5.4	4.4	19	70	1878	— 8	1884
Green Bay	616	29.35	30.04	0.69	34.0	.....	61	41.8	16	26.2	27	5	25.8	76.6	0.74	.....	5,737	s.	24	n.	29	3	16	12	4	5.5	5.4	3	63	1889	— 8	1888
Duluth	672	29.30	30.05	0.65	33.1	+10.1	64	40.6	1	25.6	32	3	24.8	76.4	1.67	+ 0.21	5,852	*	30	*	*	8	10	13	7	6.2	5.3	17	64	1889	—26	1875
Extreme northwest.					33.6	+13.8									0.33	— 0.34															
Moorhead	926	29.07	30.11	0.67	32.6	+13.6	68	42.6	— 2	22.7	36	4	24.2	79.2	0.24	— 0.59	7,951	n.	36	nw.	25	13	11	7	2	3.5	2.4	9	68	1889	—23	1884
Saint Vincent	804	29.19	30.10	0.66	30.4	+16.4	69	40.9	— 9	19.8	37	5	22.4	79.2	0.35	— 0.20	7,767	nw.	38	nw.	12	15	10	6	4	4.0	2.2	9	69	1889	—31	1883

Table of miscellaneous meteorological data for March, 1889—Signal Service observations—Continued.

Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches. Mean actual.	Mean reduced.	Monthly range.	Temperature of air, in degrees Fahrenheit. Monthly mean.	Departure from normal.	Maximum.	Mean Maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	Average cloudiness, tenths. 8 a. m.	8 p. m.	Temperature data since opening of station. Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.
Ex. northwest—Con.																																
Bismarck	1,681	28.27	30.12	0.77	36.2	+15.2	69	48.4	4	23.9	41	5	22.3	70.0	0.55	— 0.47	6,912	nw.	48	nw.	25	9	15	7	5	3.6	4.1	15	72	1876	—25	1875
Fort Buford	1,900	28.01	30.08	0.82	35.2	+1c.2	72	48.5	— 3	21.8	41	5	21.1	66.5	0.20	— 0.20	5,112	nw.	35	nw.	26	5	18	8	3	5.2	5.6	11	72	1889	—28	1888
Fort Yates	.....	.....	.....	.....	38.4	.....	72	51.3	5	25.4	42	12	.....	.....	0.33	— 0.22	.....	*	.....	.....	.....	10	16	5	3	.....	.....	6	72	1889	—18	1888
Upper Miss. Valley.					42.5	+ 6.3									1.10	— 1.24																
Saint Paul	831	29.13	30.05	0.71	36.6	+ 8.6	67	46.1	13	27.1	32	5	27.0	75.7	0.99	— 0.44	5,173	nw.	30	nw.	26	11	12	8	6	5.3	4.5	17	68	1879	—22	1873
La Crosse	744	29.24	30.06	0.71	39.0	+ 9.0	67	49.1	19	29.0	36	6	27.0	69.6	0.76	— 0.98	5,094	nw.	30	sw.	11	11	13	7	7	4.5	4.9	17	72	1875	—23	1873
Davenport	613	29.36	30.04	0.71	41.0	+ 7.0	69	50.4	23	31.7	37	5	29.2	69.9	1.74	— 0.46	5,462	nw.	34	s.	14	13	8	10	6	4.5	4.5	17	74	1875	— 8	1864
Des Moines	866	29.12	30.06	0.79	42.2	+ 7.2	69	54.5	16	29.8	37	9	27.1	66.8	0.11	— 1.45	5,257	n.	29	n.	8	14	9	8	2	4.0	4.2	11	80	1880	— 6	1864
Dubuque	665	29.31	30.04	0.68	41.0	+ 8.0	70	50.3	23	31.6	35	6	31.8	75.8	0.30	— 2.16	3,593	n.	24	nw.	27	10	14	7	3	4.0	4.6	16	75	1875	—10	1875
Keokuk	618	29.39	30.06	0.71	43.0	+ 5.0	68	51.9	21	34.0	28	3	30.0	68.0	1.04	— 1.17	5,739	nw.	26	se.	*	11	12	8	3	4.5	4.6	18	79	1875	— 2	1873
Cairo	359	29.63	30.02	0.88	50.0	+ 5.0	75	59.6	27	40.5	29	2	34.4	61.7	1.40	— 2.45	6,577	n.	45	n.	27	14	8	9	8	5.0	3.4	18	84	1879	10	1873
Springfield, Ill	644	29.34	30.04	0.69	43.3	+ 3.3	73	52.5	22	34.1	39	6	31.0	68.8	1.97	— 0.73	6,884	nw.	36	ne.	18	9	8	14	4	5.8	5.0	10	77	1886	6	1888
Saint Louis	571	29.43	30.05	0.84	40.0	+ 3.6	70	55.3	25	37.9	33	6	35.1	71.0	1.62	— 1.34	8,212	ne.	36	ne.	18	9	17	5	4	4.5	3.4	19	82	1879	8	*
Missouri Valley.					43.2	+ 6.4									1.47	— 0.06																
Kansas City	947	29.05	30.09	0.87	45.4	.....	71	54.4	22	36.5	29	6	33.9	69.6	1.61	.....	5,704	*	35	se.	14	14	5	12	6	5.4	4.7	.....	.....	.....	.....	.....
Springfield, Mo	1,356	28.58	30.04	0.96	46.2	.....	74	55.6	19	36.8	36	3	35.4	75.2	5.92	+ 3.41	7,320	*	36	n.	27	7	14	10	10	4.9	4.5	4	83	1888	13	1888
Leavenworth	842	29.17	30.07	0.93	45.2	+ 3.2	72	54.8	21	35.5	31	7	34.0	71.6	1.32	— 1.05	4,745	n.	30	s.	14	12	15	4	6	5.1	4.3	18	84	1879	2	1876
Topeka	.....	.....	.....	.....	44.9	.....	72	58.0	16	31.8	38	12	.....	.....	2.03	.....	.....	*	.....	.....	...	7	15	9	5	...	...	2	82	1888	8	1888
Omaha	1,113	28.89	30.10	0.84	42.5	+ 6.5	71	54.2	17	30.8	36	3	27.6	64.0	0.53	— 1.00	6,050	n.	30	n.	26	9	14	8	4	4.7	4.2	17	82	1879	— 7	1880
Creto	.....	.....	.....	.....	42.6	.....	70	56.2	15	29.0	39	9	.....	.....	1.42	.....	.....	nw.	.....	.....	...	11	10	10	4	...	...	2	80	1888	—13	1888
Valentine	2,613	27.32	30.11	0.81	44.0	.....	81	60.7	10	27.2	56	11	27.1	64.8	1.05	.....	6,399	n.	42	n.	3	17	5	9	4	4.0	3.4	4	74	1886	—15	1888
Fort Sully	1,600	28.36	30.10	0.81	38.0	+ 7.0	71	49.7	10	26.2	41	3	23.2	65.0	0.59	— 0.15	6,557	nw.	41	ne.	28	15	8	8	2	4.0	3.6	12	76	1883	—22	1876
Huron	1,307	28.67	30.10	0.78	36.3	+ 7.3	70	49.5	8	23.1	44	7	22.4	65.3	0.19	— 0.57	6,975	nw.	38	nw.	26	14	9	8	4	3.9	3.4	8	74	1882	—15	1884
Yankton	1,234	28.75	30.10	0.81	39.2	+ 8.2	72	52.0	13	26.3	40	7	22.2	61.8	0.27	— 0.95	5,923	nw.	32	nw.	*	17	10	4	3	3.3	3.0	16	80	1879	—18	1888
Northern slope.					39.7	+ 5.7									0.92	— 0.19																
Fort Assinaboine	2,720	27.18	30.05	0.87	38.3	+ 7.3	70	50.3	5	26.3	38	3	22.4	60.2	0.81	+ 0.18	7,344	sw.	48	sw.	31	9	5	17	7	5.3	5.9	9	70	1889	—26	1888
Fort Custer	3,040	26.87	30.06	0.95	40.6	+ 5.6	72	54.1	12	27.0	43	6	25.6	64.3	0.25	— 0.28	4,812	ne.	36	nw.	28	12	8	11	2	4.0	4.3	10	76	1882	—26	1888
Fort Maginnis	4,060	25.56	30.01	0.82	38.3	+ 7.3	67	49.6	0	27.0	48	7	28.2	67.6	1.89	+ 0.33	5,854	nw.	36	nw.	19	12	11	8	7	3.6	4.9	7	69	1887	—23	1888
Helena	4,069	25.53	30.03	0.90	39.1	+ 4.1	64	49.7	4	28.5	37	8	26.3	65.8	0.64	+ 0.10	3,912	sw.	29	ne.	28	15	7	9	7	4.4	4.5	9	67	1887	—13	1888
Poplar River	2,030	27.90	30.07	0.85	35.4	+ 7.4	72	49.7	— 7	21.0	43	7	23.2	73.0	0.43	+ 0.12	4,946	w.	39	nw.	31	5	21	5	4	4.7	4.6	6	72	1889	—35	1888
Rapid City	3,260	26.63	30.08	0.85	39.8	.....	69	51.8	10	27.7	52	7	24.8	63.2	0.56	— 0.43	6,156	w.	36	nw.	21	8	11	12	5	4.3	5.0	5	75	1882	—16	1888
Cheyenne	6,105	24.00	30.07	0.79	38.4	+ 4.4	62	51.5	15	25.4	38	11	13.0	46.6	0.26	— 0.40	7,490	nw.	42	nw.	17	7	13	11	3	2.1	3.9	17	77	1879	—17	1880
Fort Laramie	.....	.....	.....	.....	41.8	.....	71	59.4	11	24.2	53	16	.....	.....	0.03	— 0.72	.....	e.	.....	.....	...	11	5	12	2	...	...	4	73	1887	—12	1886
Fort McKinney	.....	24.96	30.03	0.90	41.0	.....	64	51.4	12	30.9	34	10	24.3	55.4	0.13	.....	6,629	W.	42	nw.	19	14	11	6	2	3.9	3.8	2	63	1888	—17	1888
Fort Washakie	5,580	24.44	30.05	0.86	37.9	.....	63	52.0	7	23.8	56	9	23.8	60.0	0.06	— 0.75	4,202	sw.	36	nw.	17	15	13	3	1	2.2	3.6	.....	.....	.....	.....	.....
North Platte	2,841	27.11	30.11	0.88	40.0	+ 3.9	69	54.5	9	27.3	43	6	24.4	60.5	0.62	— 0.02	6,366	n.	30	*	*	9	18	4	4	3.8	3.7	15	86	1879	—21	1880
Middle slope.					43.3	+ 3.1									1.57	+ 0.05																
Colorado Springs	.....	.....	.....	.....	41.0	.....	68	54.1	18	27.8	39	10	23.6	56.8	0.12	— 0.51	.....	.....	.....	.....	...	9	13	9	4	3.7	4.9	2	73	1888	1	1888
Denver	5,281	24.75	30.05	0.84	43.3	+ 3.3	70	56.3	18	30.3	40	10	20.0	48.8	0.40	— 0.54	4,957	s.	36	n.	21	3	25	3	4	3.3	3.6	0	18	81	1879	—11	1886
Pueblo	4,724	25.27	30.08	0.85	44.2	.....	73	59.5	18	29.0	45	12	17.5	43.4	0.51	.....	5,135	*	40	n.	17	7	15	9	3	4.2	6.4	.....	.....	.....	.....	.....
Concordia	1,384	28.58	30.06	0.90	44.1	+ 5.1	73	56.5	18	31.7	38	6	33.6	75.8	2.25	+ 0.20	5,224	n.	34	ne.	29	18	9	4	4	2.9	2.8	4	82	1887	1	1888
Dodge City	2,523	27.41	30.09	0.93	45.8	+ 2.8	78	58.8	21	32.7	43	9	30.4	65.2	1.38	+ 0.56	7,539	ne.	42	*	8	16	7	7	5	5.0	3.8	15	89	1879	— 8	1880
Wichita	1,354	28.58	30.04	1.01	40.5	.....	75	58.0	17	35.0	39	6	33.2	68.2	2.41	.....	7,451	n.	40	n.	18	13	11	7	8	4.7	3.7	.....	.....	.....	.....	.....
Fort Reno	.....	.....	.....	.....	49.8	.....	77	61.8	22	37.7	36	5	.....	.....	2.71	+ 1.35	.....	.....	.....	.....	...	13	7	11	8	...	...	7	90	1888	14	1883
Fort Supply	.....	.....	.....	.....	49.6	.....	83	62.9	22	36.2	45	12	.....	.....	2.82	+ 2.08	.....	*	.....	.....	...	15	8	8	7	...	...	8	86	1881	10	1888
Fort Elliott	2,650	27.24	25.99	0.96	45.1	+ 1.1	80	60.0	21	36.2	38	6	32.4	64.8	1.28	+ 0.70	10,667	nw.	48	*	*	17	3	11	7	5.4	4.0	10	87	1888	— 2	1880
Southern slope.					53.3	— 1.7									1.20	+ 0.05																
Fort Sill	1,200	28.76	30.02	1.11	52.0	0.0	79	62.9	25	41.2	38	4	40.0	72.6	1.68	+ 0.41	8,255	n.	48	s.	31	15	6	10	9	3.6	3.6	12	94	1879	10	1880
Abilene	1,748	28.20	30.03	0.87	54.6	— 3.4	83	64.6	32	44.5	34	3	45.4	77.9	1.07	— 0.15	8,558	sw.	46	n.	18	8	14	9	6	5.1	5.7	4	91	1887	22	1886
Fort Stanton	6,154	23.93	29.90	0.45	41.8	.....	72	53.2	20	30.4	42	3	20.7	50.1	0.86	— 0.12	6,121	w.	44	w.	14	7	18	6	7	4.9	4.4	6	76	1885	10	1888
Southern plateau.					51.6	+ 0.6									1.12	+ 0.09																
El Paso	3,796	26.19	29.98	0.45	53.9	— 3.1	85	66.8	29	41.0	45	8	26.0	42.8	0.67	+ 0.15	6,893	nw.	48	nw.	16	14	10	7	4	2.8	3.0	11	88	*	21	1860
Lava	.....	.....	.....	.....	48.5	.....	80	64.0	23	33.0	51	13	.....	.....	0.22	— 0.22	.....	w.	.....	.....	...	18	8	5	5	...	...	5	86	1885	19	1886
Santa Fe	7,026	23.22	30.00	0.51	41.6	+ 2.6	66	52.5	20	30.8	32	8	20.8	53.0	0.80	+ 0.21	4,967	ne.	38	ne.	21	7	17	7	8	4.5	6.0	17	82	1879	0	1880
Fort Apache	5,020	.....	.....	.....	46.8	+ 1.8	74	62.0	24	31.7	43	15	.....	.....	1.85	+ 0.16	.....	sw.	.....	.....	...	11	15	5	7	...	...	11	83	1879	11	1881
Fort Bowie	.....	.....	.....	.....	50.8	.....	75	59.8	35	41.9	26	6	.....	.....	1.58	— 0.66	.....	sw.	.....	.....	...	17	7	7	6	...	...	6	82	1885	28	1886
Fort Grant	4,866	25.21	30.05	0.43	51.8	— 0.2	76	61.9	34	41.6	29	10	35.9	59.6	1.04	— 0.11	6,048	W.	36	se.	*	15	9	7	6	2.3	3.7	11	87	1879	21	1882
Fort McDowell	.....	.....	.....	.....	59.4	.....	85	75.0	36	43.8	43	18	.....	.....	0.14	— 1.10	.....	sw.	.....	.....	...	6	20	5	4	...	...	6	93	1887	30	1886
Fort Thomas	2,710	.....	.....	.....	55.5	+ 1.5	80	69.3	33	41.7	42	10	.....	.....	0.96	— 0.22	.....	W.	.....	.....	...	17	1	13	8	...	...	9	85	1887	21	1886
Fort Verde	.....	.....	.....	.....	52.2	.....	80	68.4	29	36.0	41	15	.....	.....	1.66	+ 0.24	.....	W.	.....	.....	...	13	13	5	8	...	...	12	90	1881	11	1881
Whipple Barracks	5,389	24.70	30.02	0.54	44.0	0.0	69	57.0	25	31.1	37	10	30.2	66.9	2.91	+ 1.46	6,962	sw.	60	sw.	13	6	17	8	9	3.5	3.8	13	90	1879	— 8	1876
San Carlos	.....	.....	.....	.....	54.0	.....	84	68.4	34	39.7	41	8	.....	.....	2.15	+ 0.53	.....	s.	.....	.....	...	19	8	4	5	...	...	8	88	1887	22	1882
Wilcox	.....	.....	.....	.....	51.2	.....	82	67.3	25	35.0	51	5	.....	.....	1.06	+ 0.15	.....	W.	.....	.....	...	19	5	7	8	...	...	6	86	1887	12	1884
Yuma	141	29.78	29.92	0.61	65.6	+ 1.6	90	79.9	44	51.3	38	19	42.3	49.1	0.24	+ 0.05	4,713	ne.	40	W.	20	21	6	4	5	0.4	3.0	14	100	1879	31	1881
Keeler	3,622	26.28	29.92	0.84	50.3	+ 0.6	75	63.0	36	44.2	28	6	30.2	45.5	0.82	+ 0.26	6,184	*	45	nw.	20	14	14	3	5	3.1	3.9	5	77	1887	27	1886
Middle plateau.					45.5	+ 4.5									0.72	— 0.35																
Carson City	.....	.....	.....	.....	44.8	.....	71	57.6	24	31.9	39	10	23.4	34.4	1.73	.....	.....	.....	.....	.....	...	14	11	6	7	2.9	4.9	2	66	1888	17	1888
Winnemucca	4,340	25.61	30.00	0.92	45.2	+ 3.2	70	58.1	24	32.4	41	13	26.5	52.5	0.47	— 0.23	7,224	W.	47	W.	23	8	12	11	5	4.8	5.0	11	82	1879	— 3	1882
Fort Du Chesne	4,900	25.04	30.02	0.76	41.2	.....	71	58.4	17	26.6	43	14	19.4	49.8	0.32	.....	2,864	s.	28	W.	16	16	11	4	3	1.9	3.4	2	69	1888	10	1886
Salt Lake City	4,348	25.63	30.02	0.79	47.7	+ 6.7	68	57.5	32	37.9	29	7	30.3	53.0	1.04	— 0.35	4,180	nw.	34	se.	13	17	9	5	7	3.3	5.0	16	76	1879	4	1874
Montrose	5,795	24.26	29.98	0.62	43.5	+ 3.5	68	56.1	23	30.9	33	10	21.4	46.2	0.05	— 0.46	3,887	se.	28	sw.	14	14	8	9	1	3.8	4.9	5	72	1887	7	1888
Northern plateau.					48.6	+ 6.6									1.74	+ 0.39																
Boisé City	2,750	27.15	30.00	0.97	50.2	+ 7.2	74	61.9	30	38.5	35	9	31.8	53.4	1.03	— 0.16	3,543	W.	33	W.	23	7	16	8	11	4.1	5.3	12	76	1881	9	1882
Ashland	.....	.....	.....	.....	52.9	.....	79	65.7	31	40.2	40	11	.....	.....	1.72	+ 0.26	.....	s.	.....	.....	...	5	10	16	12	...	...	6	80	1887	20	1884
Fort Klamath	.....	.....	.....	.....	41.4	.....	67	53.5	18	29.3	47	9	.....	.....	2.13	+ 0.72	.....	s.	.....	.....	...	12	2	17	14	...	...	5	68	1885	— 3	1888
Linkville	.....	.....	.....	.....	44.0	.....	74	54.2	24	33.8	32	9	.....	.....	2.24	+ 0.81	.....	s.	.....	.....	...	8	5	18	7	...	...	6	74	1889	7	1885
Spokane Falls	1,909	27.98	30.01	1.00	46.8	+ 5.8	72	58.9	25	34.6	40	6	34.6	69.4	1.93	+ 0.77	3,015	sw.	18	e.	13	8	15	8	8	3.4	5.2	9	74	1881	7	1882
Walla Walla	1,018	28.88	29.98	1.09	53.0	.....	72	63.4	32	42.5	30	11	38.4	60.8	1.39	— 0.05	3,930	sw.	26	sw.	23	13	15	3	10	3.8	5.0	4	74	1886	12	1885
N. Pac. coast region.					50.6	+ 4.9									3.89	— 1.79																
Fort Canby	179	29.72	29.91	1.30	51.2	+ 5.2	70	56.1	41	46.2	23	3	45.0	80.4	4.84	— 1.62	9,769	s.	72	s.	17	5	9	17	21	5.8	6.5	6	70	1889	32	1886
Neah Bay	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	5	65	1885	24	1888
Olympia	36	29.90	29.94	1.24	49.8	+ 4.8	73	59.6	31	40.0	41	8	43.4	82.6	3.91	— 1.53	2,191	*	20	sw.	18	9	8	14	19	5.9	6.4	12	73	1889	23	*
Port Angeles	14	29.90	29.91	1.23	45.6	+ 4.6	59	53.2	30	38.1	24	6	40.0	84.8	2.43	+ 0.27	1,480	s.	24	w.	*	6	5	20	15	6.9	6.8	6	59	1889	20	1884
Pysht	.....	.....	.....	.....	40.6	.....	61	54.3	32	39.0	29	5	.....	.....	4.52	— 2.45	.....	sw.	.....	.....	...	5	12	7	12	...	...	6	61	*	18	1884
Tatoosh Island	86	29.76	29.87	1.30	49.6	+ 4.6	60	53.5	39	45.8	13	3	45.0	86.8	6.18	— 1.91	12,562	e.	52	e.	19	7	3	19	15	7.0	7.4	6	64	1885	25	1884
Astoria	38	.....	.....	.....	51.8	+ 4.8	72	58.3	38	45.2	30	5	.....	.....	5.18	— 1.63	.....	sw.	.....	.....	...	7	8	16	19	...	...	5	72	1889	28	1888
Portland	80	29.85	29.94	1.25	53.5	+ 5.8	78	63.9	35	43.7	35	6	43.6	72.4	1.80	— 4.46	4,049	nw.	28	sw.	23	8	12	11	13	5.6	6.2	16	79	1886	24	1888
Roseburgh	323	29.37	29.93	1.23	52.1	+ 4.7	80	64.6	29	40.8	44	6	42.8	73.8	2.24	— 1.01	2,370	nw.	24	*	*	4	17	10	15	5.7	6.8	12	81	1887	19	1880
Mid. Pac. coast reg.					51.1	+ 3.1									6.96	+ 4.02																
Eureka	64	29.88	29.94	1.14	52.2	.....	66	58.8	39	45.6	22	5	46.5	82.5	5.91	.....	4,709	se.	36	se.	12	2	10	19	15	6.2	7.6	3	68	1888	32	1888
Red Bluff	342	29.60	29.95	0.94	50.8	+ 0.8	82	66.5	42	47.2	34	6	44.2	68.8	0.83	+ 4.03	6,400	s.	36	s.	*	9	9	13	15	5.3	6.3	12	85	1885	28	1880
Sacramento	64	29.89	29.96	0.87	57.4	+ 2.4	76	66.3	41	48.5	35	5	48.3	76.2	6.25	+ 3.21	5,273	se.	30	nw.	30	6	12	13	14	3.1	5.7	12	80	1882	29	1880
San Francisco	60	29.90	29.96	0.99	57.2	+ 3.2	79	63.5	47	50.9	23	5	48.9	79.4	7.78	+ 4.83	6,446	sw.	32	ne.	16	4	20	7	16	5.1	6.0	19	79	1889	38	1888
Point Reyes Light	.....	.....	.....	.....	54.1	.....	73	60.1	43	48.1	21	5	.....	.....	6.06	.....	.....	*	.....	.....	...	16	.....	.....	16	...	...	.....	.....	.....	.....	.....
S. Pac. coast region.					59.2	+ 2.7									4.34	+ 2.24																
Fresno	328	29.63	29.98	0.87	58.4	.....	84	70.3	38	46.5	33	9	46.9	72.2	2.07	.....	4,633	e.	24	*	*	12	8	11	6	1.9	5.0	2	84	1889	28	1888
Los Angeles	330	29.64	29.99	0.57	59.2	+ 2.2	81	69.1	44	49.4	31	9	48.8	76.8	6.48	+ 3.75	2,987	W.	24	e.	15	9	18	4	7	4.6	4.2	12	99	1879	35	1882
San Diego	93	29.91	30.01	0.51	59.2	+ 3.2	80	67.2	45	51.1	35	7	51.6	79.8	2.20	+ 0.72	4,018	nw.	36	s.	15	14	8	9	6	4.9	5.0	18	99	1879	38	1880

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. *Two or more directions, dates, or years. †2.17, this precipitation is measured at the Boston Water Works, and takes the place of the measurement at the Signal Office.

Chart I. Tracks of Areas o



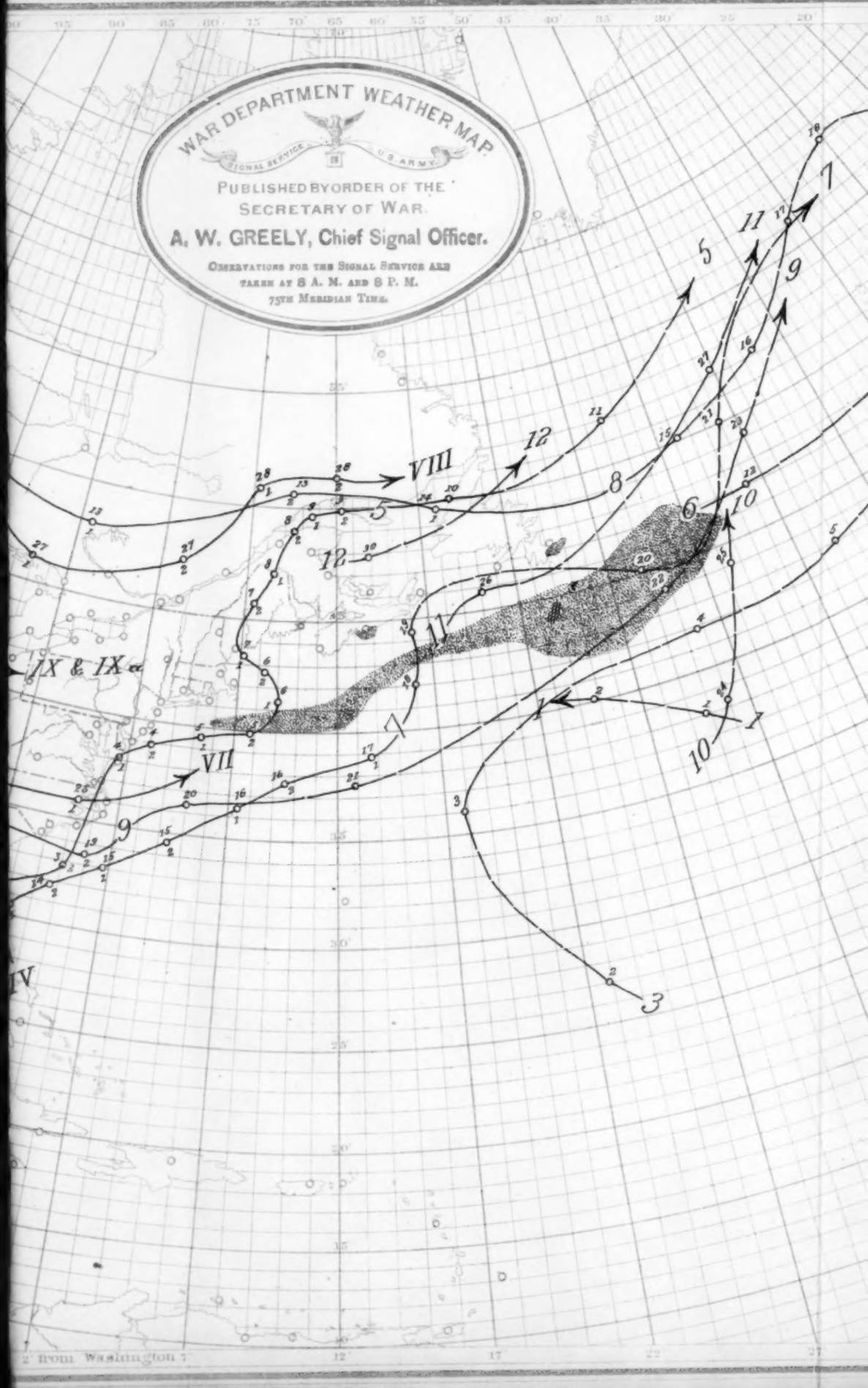
NOTES.

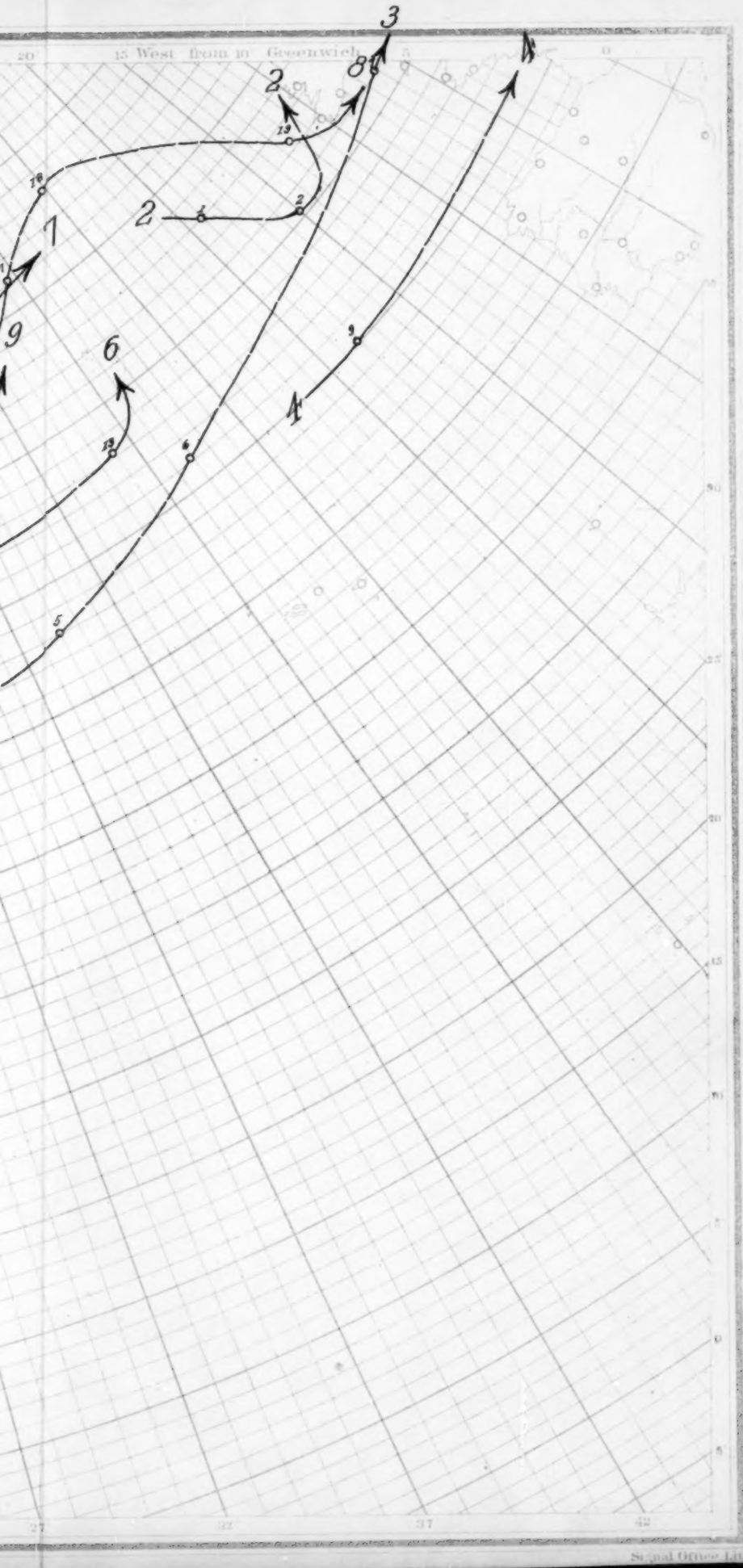
The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1 and 2) indicate, respectively, the 8 a. m. and 8 p. m., 75th meridian time, observations.

The dotted shading (▒▒▒) indicates fog belts.

The ruled shading (▰▰▰) indicates the position in which field-ice was observed.

rt I. Tracks of Areas of Low Pressure. March, 1889.





Signal Office 14th

Form 106 F.

Chart II. Isobars, Isotherms, and Winds. March, 1889.

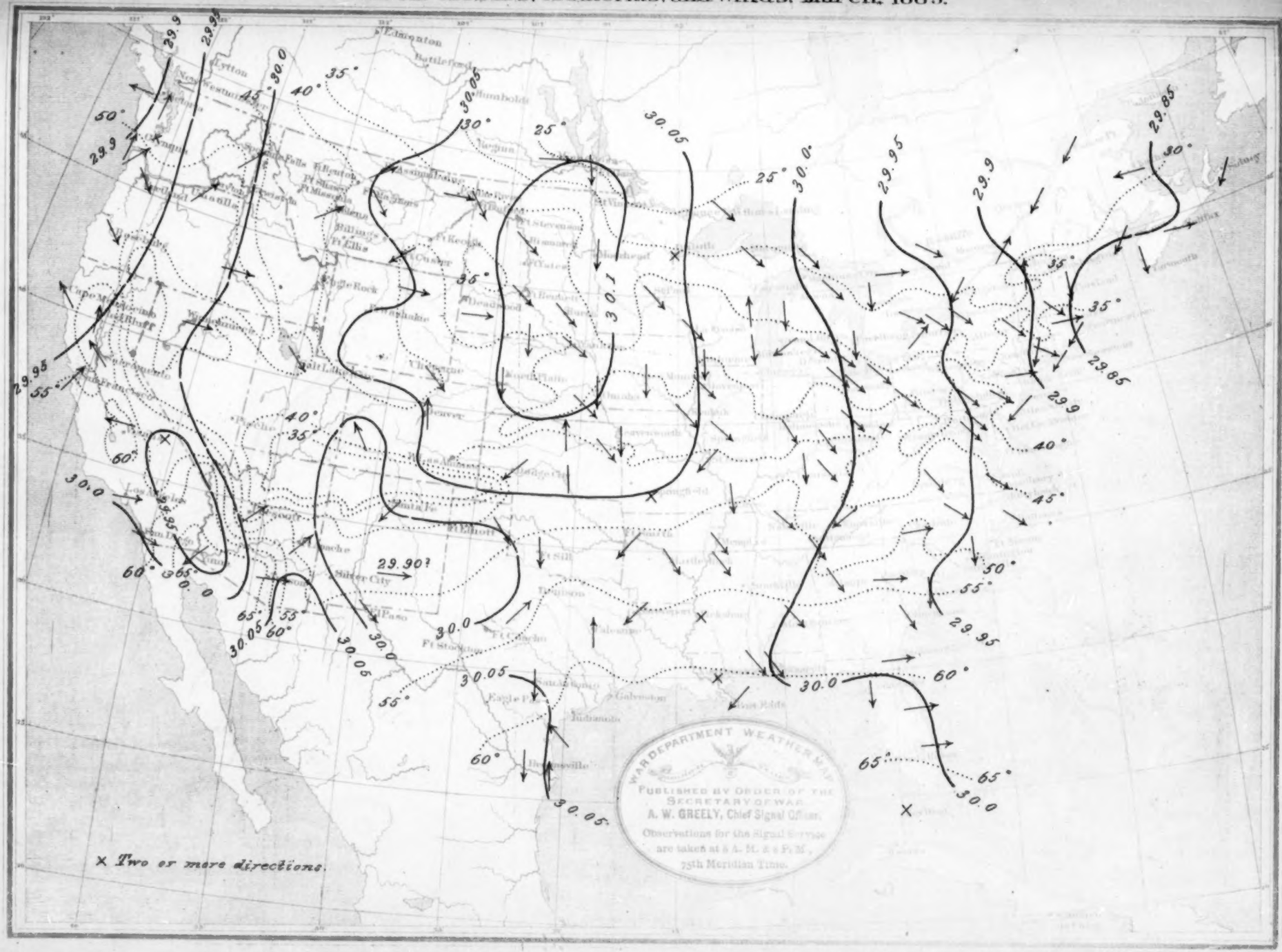
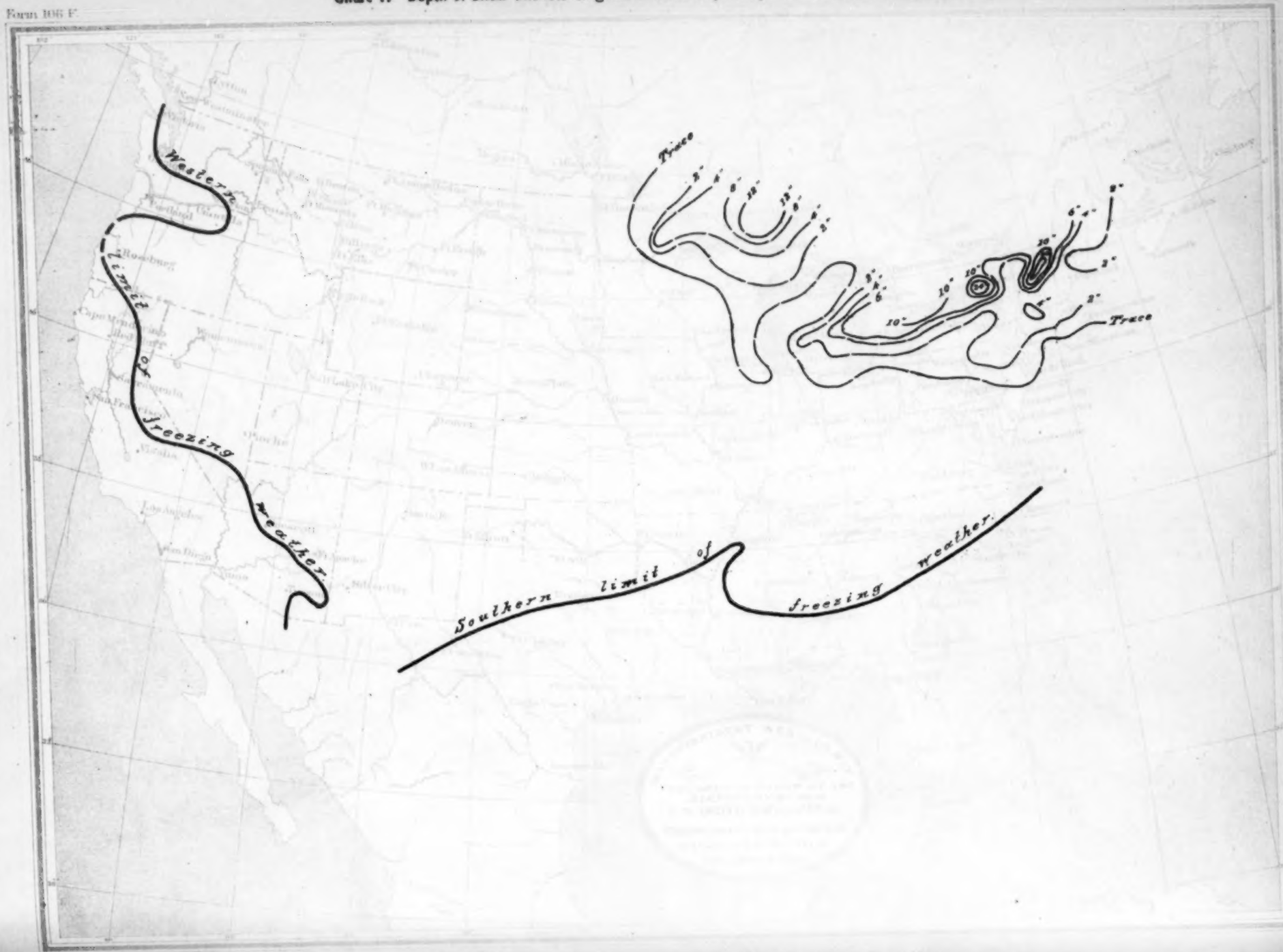


Chart V. Depth of Snow (inches) on ground March 31, 1889, and Limits of Freezing Weather.

Form 1066 F.

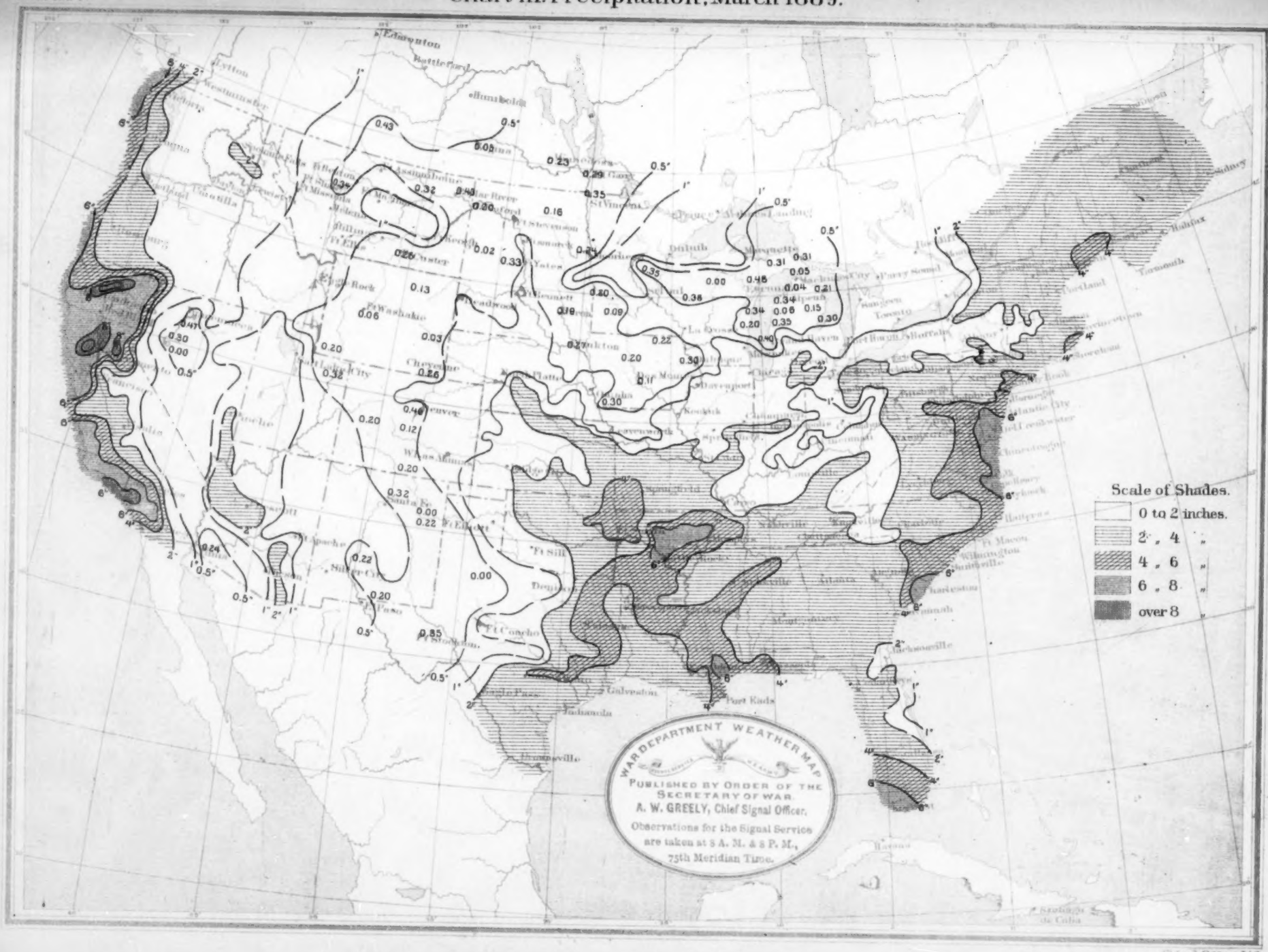


Form 1066 F.

Chart III. Precipitation, March 1889.

Form 106 P

Chart III. Precipitation, March 1889.



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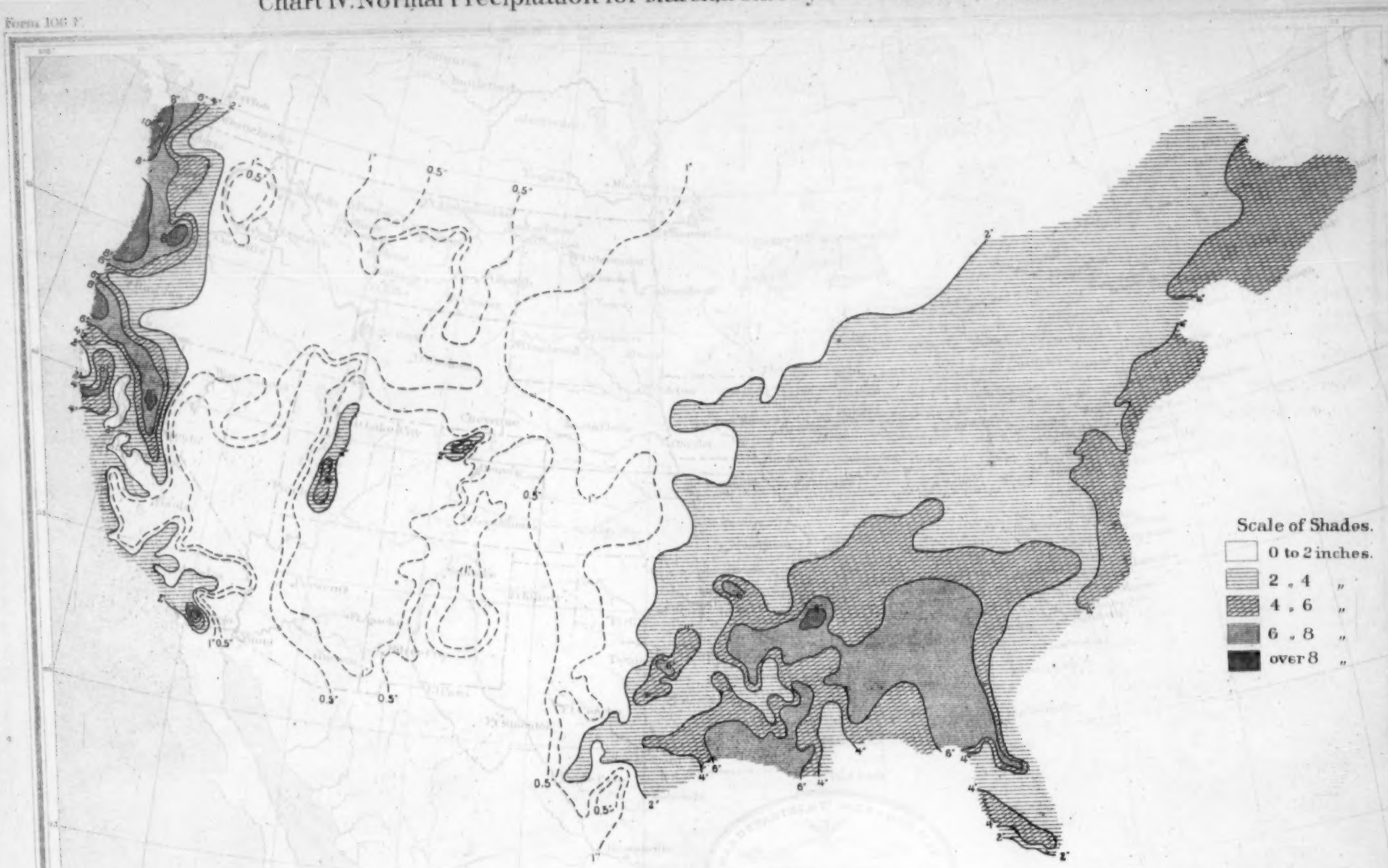
Form 106 F.

Chart IV. Normal Precipitation for March, from 18 years observations, 1870 to 1888.



List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review. Those marked with an asterisk (*) did not send reports in time to be used in Review for March, 1889.

Place of observation and observer.

ALABAMA.

Auburn, Alabama Weather Service.
*Bermuda, Wm. Fowler.
Citronelle, J. G. Michael.
*Gadsden, D. P. Goodhue.
Livingston, J. W. A. Wright.
*Motes, A. M. Weiler.
New Market, Dr. Geo. D. Norris.
*Selma, W. D. Dunlap, Jr.
*Troy, Jas. Waldauer.
*Valley Head, E. P. Nicholson, M. D.

ARIZONA.

Antelope Valley, Mrs. J. H. Hamilton.
*Ash Canyon, John S. Robbins.
*Bangharts, Geo. Banghart.
Cedar Springs, R. E. Norton.
Eagle Pass, Dr. R. B. Tripp.
*Flagstaff, Mrs. F. B. Jacobs.
Florence, A. T. Colton, C. E.
Globe. J. H. Hamill.
Holbrook, David Rope.
Huachuca, J. W. Stump.
Phœnix, S. H. Campbell.
*Prescott Junction, W. W. Burnett.
Teviston, Miss Mary Tevis.
Tucson, Edward L. Wetmore.
Williams, J. T. Ryan.
Willow Springs, F. A. Chamberlin.
Winslow, L. W. Roberts.

ARKANSAS.

Lead Hill, Silas C. Turnbo.
Little Rock, Arkansas Weather Service.

CALIFORNIA.

Anderson, Dr. A. Fouch.
Banning, Welwood Murray.
Barstow, Geo. R. Gooding.
Colegrove, Seward Cole.
Georgetown, C. M. Fitzgerald.
Hanford, Dr. W. H. Miller; A. E. Gribi.
*Hydesville, E. T. Foss.
Lewis Creek, John Tuohy.
*Needles, John J. Clark.
*Nicolaus, Alvah Pendleton.
Oakland, Dr. J. B. Trembley.
Oroville, Hiram Arents.
Sacramento, S. H. Gerrish.
Salinas, Dr. E. K. Abbott.
Santa Barbara, H. D. Vail.
Santa Maria, L. E. Blochman.
Susanville, T. B. Sanders.
Willow, David Bentley.

COLORADO.

Bennett, I. S. Putnam. [Service.
*Colorado Springs, Colorado Weather
Coulter, Jesse E. Glick.
Delta, J. A. Curtis.
Fort Collins, Prof. L. G. Carpenter.
Georgetown, W. A. Jayne, M. D.
Greeley, E. Bethel.
Rocky Ford, F. Watrous.

CONNECTICUT.

*Hartford, Wm. R. Matson.
New Hartford, Rev. Wm. Goodwin.
*Southington, Luman Andrews.
Voluntown, Rev. E. Dewhurst.

DAKOTA.

Brookings, Prof. Lewis McLouth.
Davenport, J. W. Leech.
Gallatin, S. J. Pound.
Garden City, W. C. T. Newell.
*Grand View, J. F. Angus.
*Highmore, W. R. McDowell.
Kimball, A. S. Stuver.
New England City, E. S. Clough.
Onida, Mrs. M. F. Goddard.
*Parkston, John J. Swartz.
Spearfish, J. H. Warren.
Spring Lake, A. Gould.
Webster, Arthur Betts.
Wolsey, G. W. Frink.
Woonsocket, L. O. Libbey.

DELAWARE.

Newark, Prof. Geo. A. Harter.
Kirkwood, Wm. Carnagy.
Viola. J. A. Farion.

DISTRICT OF COLUMBIA.

Kendall Green, Deaf & Dumb Institute.
*Receiving Reservoir } Washington
*Distributing Reservoir } Aqueduct
*Rock Creek Bridge }

FLORIDA.

Altamonte Springs, M. E. Bingham.
Alva, Chas. E. Robins.
Fort Meade. A. H. Adams.
Homeland, J. S. Wade.
Kissimmee, E. E. W. Brewster.
Manatee, Mrs. Mary W. Broberg.
Matanzas, Mrs. B. E. Dupont.
Merritt's Island, Rev. J. H. White.

Place of observation and observer.

FLORIDA—Continued.

Tallahassee, Rev. Dr. W. H. Carter.
Villa City, J. Emory Round.

GEORGIA.

*Andersonville, H. W. Bryant.
Athens, Prof. L. H. Charbonnier.
Duck, A. L. Gillespie.
Forsyth, Thos. G. Scott.
Hephzibah, R. L. Rhodes.
Marietta, G. S. Owen.
Milledgeville, S. A. Cook.
Quitman, J. L. Cutler.
Thomasville, C. S. Boudurant.

IDAHO.

Lewiston, Robert Schleicher.

ILLINOIS.

*Charleston, J. B. Dazey.
*Collinsville, Dr. J. L. R. Wadsworth.
*Jacksonville, P. J. Hasenstab.
Mattoon, Wm. Dozier.
Mount Morris, Wm. Feary.
Oswego, John S. Seely.
Palestine, John E. Templeton.
Pekin, Rev. J. E. Terborg.
*Peoria, Dr. Fred. Brendle.
Philo, H. A. Burr.
Riley, John W. James.
Rockford, T. D. Robertson.
Sandwich, Dr. N. E. Ballou.
South Evanston, Dr. M. D. Ewell.
Springfield, Illinois Weather Service.
Sycamore, Roswell Dow.
*Windsor, A. H. Hatch.

INDIANA.

Butlerville, C. F. Hole.
Dana, J. E. Wright.
Huntertown, J. E. Hunter.
Jeffersonville. J. C. Loomis.
*Laconia, Lafe Crozier.
La Fayette, Indiana Weather Service.
Mauzy, Elwood Kirkwood.
New Providence, Prof. E. S. Hallett.
Point Isabel, Jas. F. Hood.
Salem. J. W. May.
Scalesville. Urias Wilson.
Sunman. B. F. Ferris.
Vevay, Prof. Chas. Boerner.

INDIAN TERRITORY.

Caddo Creek, P. Leming, M. D.
Jimtown, M. M. Yeakley.

IOWA.

*Albion, Enoch Lewis
Amana, Conrad Schadt.
Ames, J. Rush Lincoln.
Bancroft, H. N. Renfrew.
Blakeville, James Rogers.
Cedar Rapids, H. D. Olds.
Clarinda, A. S. Van Sandt.
Clinton, Luke Roberts.
Cresco, Gregory Marshall.
*Cromwell, Harry C. Harrison.
Denmark, G. B. Brackett.
Des Moines, Adolphus Voegeli.
Dunkerton, J. W. Boyle.
Dysart, Jos. Dysart.
Elkader, J. N. Hamilton.
Fayette, Upper Iowa University.
Fort Madison, Miss L. A. McCready.
Gillett, H. L. Pierce.
Glenwood, Seth Dean.
Glenwood, A. Schappel.
*Grinnell, Prof. S. J. Buck.
Hampton. E. C. Grenelle.
Humboldt, Miss Florence Prouty.
Independence, Emil F. Wülfke.
Iowa City, Prof. A. A. Veblen.
Iowa City, Iowa Weather Service.
Logan, Mrs. M. B. Stern.
Manson, W. L. Thompson.
Maquoketa, A. B. Bowers.
Monticello, H. D. Smith.
Mount Pleasant, Dr. Max E. Witte.
Mount Vernon, Prof. Alonzo Collin.
Muscatine, J. P. Walton.
Osage, G. D. Pattingill.
Osceola, F. M. Kyte.
Oskaloosa, Joseph Boyd
*Oskaloosa, O. H. Avey.
Sac City, Dr. Caleb Brown.
*Smithland, Dr. Chas. W. Rice.
Vinton, T. F. McCune.
Washington, Wm. A. Cook.
Wesley, Wm. Ward.

KANSAS.

Allison, John J. Cass.
Bendena, G. Campbell.
Cawker City, A. G. Alrich.
Colby, C. E. Bennett.
Cunningham, E. Shaw.

Place of observation and observer.

KANSAS—Continued.

Elk Falls, Dr. A. C. Williams.
Emporia, Prof. J. H. Dinsmore, Jr.
Englewood, C. D. Perry.
Gibson, C. M. Bell.
Globe, Wm. Featherston.
Havensville, L. W. Dennen.
Independence, J. M. Altaffer.
La Harpe, Isaac S. Coe.
Lawrence, Prof. F. H. Snow.
Lebo, C. W. Burnet.
Leoti, A. P. Barker.
Manhattan, C. P. Blachley.
*Manhattan, F. J. Rogers.
Morse, R. P. Edgington.
Salina, J. H. Gibson.
Santa Fe, Judge A. P. Heminger.
Sedan, J. W. Goodell.
Topeka, Kansas Weather Service.
Tribune, S. B. Jackson.
Wakefield, Wm. P. Cochran.
Wellington, John H. Wolfe.
Yates Centre, F. R. Gray.

KENTUCKY.

Ashland, J. M. Ferguson.
Bernstadt, John de Planta.
Bowling Green, M. H. Crump.
Falmouth, F. G. Held.
Frankfort, E. C. Went.
Lexington, V. E. Muncy.
Louisville, Kentucky Weather Service.
Madisonville, T. J. Gill.
Millersburgh, C. Pope.
Mount Sterling, H. C. McKee.
Owensborough, Watkins & Carter.
Owenton, J. S. Cox.
Pellville, Oscar Haynes.
Richmond, Prof. O. A. Kennedy.
Shelbyville, H. W. Prissler.
South Fork, A. B. Gilbert.

LOUISIANA.

Cameron, Hon. J. P. Henry.
*Convent, Prof. F. Greene.
Crowley, A. B. Goodrich.
Franklinton, T. M. Babington.
Grand Coteau, Rev. C. M. Widman.
Houma, H. F. Belanger.
Liberty Hill, E. A. Crawford.
Luling, F. M. Rogers.
Mandeville, Hon. Alex. Baird.
Marksville. Leon Molenar.
Mount Airy (near), Dr. L. D. Chauff.
New Iberia, Mrs. J. A. Gilbert.
New Orleans, Louisiana Weather Service.
Port Eads, Mrs. C. L. Kleinpeter.
*Port Eads, Miss Mattie Lawes.
Vidalia, L. P. Ault.

MAINE.

Bar Harbor, Joseph Wood.
Cornish, Silas West.
Gardiner, Henry Richards.
Kent's Hill, W. C. Strong.
Orono, Prof. M. C. Fernald.

MARYLAND.

Barren Creek Sp'gs, Albert E. Acworth
Cumberland, E. T. Shriver.
Fallston, Prof. G. G. Curtis.
Frederick, McClintock Young.
Gaithersburgh, John T. De Sellum.
Galena, Henry Parr.
*Gambrill's, J. E. Moque.
*Great Falls, Washington Aqueduct.
Jewell, Jos. Plummer.
McDonogh, McDonogh Institute.
M't St. Mary's, M't St. Mary's College.
Woodstock, Woodstock College.

MASSACHUSETTS.

Amherst, Miss S. C. Snell.
Amherst, Massachusetts Agricultural Experimental Station.
Blue Hill, Rev. A. K. Teele.
Blue Hill Observatory, A. L. Rotch.
Cambridge, Harvard College Obs'y.
Deerfield, Rev. A. Hazen.
Dudley, Conant Observatory.
Fall River, C. V. S. Remington.
Heath, B. B. Cutler.
Holyoke, J. W. Doran.
Leicester. Arthur Kendrick.
New Bedford, Thomas R. Rodman.
Newburyport, F. V. Pike.
North Billerica, C. H. Kohlrausch.
Provincetown. John R. Smith.
Royalston, Miss Lizzie W. Chase.
Somerset, Elisha Slade.
Taunton, E. U. Jones, M. D.
Westborough, G. S. Newcomb.
Williamstown, Williams College Obs'y.
Worcester, J. B. Hall.

Place of observation and observer.

MICHIGAN.

Benton Harbor, A. J. McCave.
Berrien Springs, F. A. Zerby.
Birmingham, S. Alexander.
Harrisville, Dr. D. W. Mitchell.
Hudson, Major A. H. Boies.
Kalamazoo, W. A. Black.
Lansing, Dr. H. B. Baker.
Lansing, Michigan Weather Service.
Marshall, G. H. Greener, M. D.
Mottville, J. A. Hartzler.
Thornville, John S. Caulkins.
Traverse City, S. E. Wait.
Ypsilanti, J. C. Bemiss.
Ypsilanti, C. S. Woodard.

MINNESOTA.

Le Sueur, L. B. Davis.
Minneapolis, Wm. Cheney.
*Minneapolis, Prof. W. A. Pike.
Northfield, Minnesota Weather Service.

MISSISSIPPI.

*Agricultural College, B. W. Kilgore.
Kosciusko, L. Heyman.
Louisville, B. T. Webster.
Macon, A. T. Dent.
*Palo Alto, W. H. Hill.
*Pearlington, C. D. Koch.
Pontotoc, C. W. Bolton.
Summit, J. N. Teunisson.
University, Mississippi Weather Service.
Waynesborough, W. S. Davies.

MISSOURI.

Conception, Rev. Fr. Paul.
Excelsior Springs, A. Reinisch.
*Fayette, Prof. T. Berry Smith.
Frankford, W. W. Vermillion.
Grand Pass, E. R. Graham.
Lakenan, C. Ayres.
New Frankfort, G. W. Hawkins.
Ozark, J. J. Brown.
*Pierce City, J. J. Spilman.
Princeton, Wm. Hirons.
St. Louis, Missouri Weather Service
*Warrenton, Prof. J. H. Frick.

MONTANA.

Sheldon, P. J. Bond.
Virginia City, Eugene Stark.

NEBRASKA.

Ansley, P. Fowlie.
*Creighton, Geo. Roberts.
Crete, Nebraska Weather Service.
Culbertson, G. D. Carrington.
David City, John R. Townsend.
De Soto, Chas. Seltz.
Fairbury, Dr. I. Humphrey.
Falls City, A. B. Newkirk.
Fremont, Isaac E. Heaton.
Genoa, Geo. S. Truman.
Hay Springs, Wm. Waterman.
Kimball, Wm. G. Barton.
Lincoln, University of Nebraska.
Marquette, John Ellis,
North Loup, M. B. C. True.
Syracuse, P. W. Risser.
Tecumseh, W. L. Dunlap.
Weeping Water, G. Treat.

NEVADA.

*Carson City, Chas. W. Friend.
Carson City, Nevada Weather Service.

NEW HAMPSHIRE.

Antrim, Frank W. Palmer.
Berlin Mills, O. A. Bridges.
Concord, W. L. Foster.
Nashua, Chas. H. Webster.
North Sutton, C. E. Hosmer.
Shaker Village, N. A. Briggs.
Belmont, } Lake Winnipiseogee
Bristol, } Cotton and Woollen
Lake Village, } Manufacturing Co.
Weir's Bridge, } Manufacturing Co.
Wolfeborough, }

NEW JERSEY.

Beverly, C. F. Richardson.
Egg Harbor City, H. Y. Postma.
Jersey City, Wright Babcock.
Moorestown. Thos. J. Beans. [Service.
New Brunswick, New Jersey Weather
Readington, John Fleming.
South Orange, Dr. W. J. Chandler.
*Vineland, Dr. O. H. Adams.
Woodbury, W. T. Wilson.

NEW MEXICO.

Coolidge, B. S. Mullin.
Gallinas Spring, J. E. Whitmore.
Las Vegas, F. W. Chatfield.

NEW YORK.

Angelica, J. P. Slocum.
Ardenia, Richard B. Arden.
*Auburn, Geo. Casey.

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review—Cont'd.

Place of observation and observer.

NEW YORK—*Continued.*

Barnes' Corners, W. C. Fawdrey.
Boyd's Corners, Thomas Manning.
*Brooklyn, Prof. W. C. Peckham.
Canton, Henry Priest.
Constableville, R. Sanford Miller.
Cooperstown, G. Pomeroy Keese.
Eden, W. P. Hunt.
Elmira, Gerity Brothers.
Factoryville, T. P. Yates.
Fleming, Robt. Warwick.
Friendship, Jesse D. Rogers.
Geneva, Mrs. N. S. Yates.
Hess Road Station, C. H. Spaulding.
Humphrey, Chas. E. Whitney.
Ilion, G. A. Trowbridge.
Ithaca, Cornell University.
Ithaca, New York Weather Service.
*Johnstown, W. S. Snyder.
Kingston, H. A. Stone.
Le Roy, Prof. F. M. Comstock.
Lowville, W. Hudson Stephens.
Middleburgh, F. X. Straub.
Newfane, F. B. Clark.
New York, Central Park Observatory.
Nineveh, W. J. Barnett.
North Hammond, C. A. Wooster.
North Volney, J. M. Patrick.
Number Four, Chas. Fenton.
Palmyra, L. D. Cummings.
Pendleton, W. D. Lovell.
*Penn Yan, Geo. R. Young.
Perry City (near), W. H. Jeffers.
Potsdam, Peter Vilas; G. W. F. Smith.
Queensbury, DeWitt C. Jenkins.
Salem, W. W. Hance.
Saranac Lake, Jas. P. Mills.
Savona, M. S. Collier, M. D.
Setauket, Selah B. Strong.
Somerset, J. W. Thurber.
South Canisteo, J. E. Wilson.
South Kortright, D. C. Sharpe.
Utica, Thomas Birt.
Vermillion, E. B. Bartlett.
Waddington, Jos. Graves.
Wedgewood, O. F. Corwin.
White Plains, Prof. O. R. Willis.

NORTH CAROLINA.

Asheville, Dr. Karl von Ruck.
Chapel Hill, Prof. J. W. Gore.
Hot Springs, Dr. W. F. Ross.
Lenoir, Dr. R. L. Beall.
Raleigh, Thos. C. Harris.
Raleigh, North Carolina Weather Service.
Statesville, W. A. Eliason.
Weldon, T. A. Clark.

OHIO.

Bellevue, Wm. Sheffield.
Cleveland, G. A. Hyde.
College Hill, John W. Hammitt.
Collinwood, Wm. Smeed.
Columbus, Ohio Weather Service.
Demos, B. B. Ault.
*Elyria, C. W. Goodspeed.
Garrettsville, S. M. Luther.
Gracey, H. M. Scott.
Jacksonborough, Dr. J. B. Owsley.
Kenton, L. J. Demarest.
Lordstown, W. S. Dean.
Napoleon, Dr. T. C. Hunter.
*New Athens, T. M. Sewell.
North Lewisburgh, H. D. Gowey.
*Portsmouth, Dr. D. B. Cotton.

Place of observation and observer.

OHIO—*Continued.*

*Ruggles, Peter Bowman.
Tiffin, Rev. T. H. Sonedecker.
Wauseon, Thos. Mikesell.
Westerville, Prof. John Haywood.
West Milton, Luke S. Motte.
*Yellow Springs, Chas. W. Rice.

OREGON.

Albany, John Briggs.
Bandon, Geo. Bennett.
*East Portland, Dr. Geo. Wigg.
Eola, Thos. Pearce.
McMinnville, Prof. W. J. Crawford.
Mount Angel, Rev. F. Barnabas Held.
Tillamook, A. P. Wilson.

PENNSYLVANIA.

Altoona, Chas. B. Dudley, M. D.
Blooming Grove, John Grathwohl.
Catawissa, Robt. M. Graham.
Corry, Wm. Loveland.
Drifton, H. D. Miller.
Dyberry, Theo. Day.
East Brook, L. E. Stunkard.
Easton, Dr. J. W. Moore.
Edinborough, C. F. Sweet.
Franklin, Joseph Bell.
Germantown, Thos. Meehan.
Grampian Hills, Nathan Moore.
Haverford, H. V. Gummere.
Le Roy, Geo. W. T. Warburton.
Meadville, David Logan.
Meshoppen, Stephen S. Jenkins.
*Mount Joy, E. M. Allen.
Nisbet, J. S. Gibson. [Service.
Philadelphia, Pennsylvania Weather
Philipsburgh, G. F. Dunkle.
Pleasant Mount, J. D. Brennan.
Quakertown, J. L. Heacock.
Reading, C. M. Dechant.
Salem Corners, T. B. Orchard, M. D.
State College, Agricultural Experimental Station.
Troy, M. Gustin.
Wellsborough, Hiram D. Deming.
West Chester, Dr. Jesse C. Green.
Westtown, Wm. F. Wickersham.

SOUTH CAROLINA.

*Aiken, Dr. W. H. Geddings.
Cedar Springs, J. T. Bayerly. [vice.
Columbia, South Carolina Weather Ser-
*Conway, J. G. Rogers.
Kirkwood, Colin Macrae.
Statesburgh, Dr. W. W. Anderson.

TENNESSEE.

Ashwood, Rev. C. F. Williams.
Austin, P. B. Calhoun.
Milan, Dr. M. D. L. Jordan.
Nashville, State Board of Health.
Riddleton, F. K. Fergusson.

TEXAS.

Austin, Oscar Samostz.
Baird, D. Richardson.
Bear Creek Ranche, W. H. Potter.
*Belton, E. A Sterling.
Brazoria, H. Stevens.
Brenham, J. G. Sloan.
Brownwood, J. F. Mayo.
Cedar Hill, J. P. Berry.
Cleburne, P. J. Norwood.
College Station, Prof. J. H. Kinealy.
*Colorado, Fred R. Blount.
Columbia, J. S. Rogers.

Place of observation and observer.

TEXAS—Continued.

*Comanche, E. U. Wiesendanger.
Corsicana, E. L. Gibson.
Corsicana, W. H. Hamilton.
Decatur, H. D. Donald.
Forestburgh, J. N. Morris.
Fort Worth, Whit Dryden.
Gallinas, Lum Woodruff.
Galveston, Texas Weather Service.
Granbury, E. H. Snider.
*Houston, A. Hutchinson.
Huntsville, G. Buckingham.
*Ingersol, E. T. Page.
La Grange, Jos. Cottam.
Lampasas, Dr. C. M. Ramsdell.
Longview, G. W. Krech.
Luling, W. H. Rather.
Mesquite, Silas G. Lackey.
Mexia, Chas. F. Mercer.
New Braunfels, Paul Wipprecht.
New Ulm, C. Runge.
Silver Falls, C. M. Tilford.
Snyder, A. C. Wilmeth.
*Tyler, C. E. Wood.
Victoria, W. S. Chimett.
Waco, W. H. Godber.

UTAH.

*Lake Park, F. Blume.

VERMONT.

Brattleborough, W. H. Childs.
Burlington, W. R. Gates.
*Coventry, W. H. Tibbetts.
East Berkshire, H. B. Lovering.
Lunenburgh, Dr. Hiram A. Cutting.
*Manchester, Rev. E. P. Wild.
*Middlebury, S. Holton.
*Newport, M. B. Trasher.
Saint Johnsbury, F. Fairbanks.
Strafford, H. F. J. Scribner.

VIRGINIA.

Bird's Nest, C. R. Moore.
Christiansburgh, H. D. Walters.
Dale Enterprise, L. J. Heatwole.
Marion, A. T. Lincoln.
Petersburgh, Jas. M. Colson, Jr.
Spottsville, B. W. Jones.
Summit, J. R. Sim.
University of Va., James Wearmouth.
*Variety Mills, J. H. Micklem.
Wytheville, Howard Shriver.

WASHINGTON TERRITORY.

Blakeley, R. M. Hoskinson.
*Tacoma, E. N. Fuller.
Vashon, Mrs. C. B. Carpenter.

WEST VIRGINIA.

Clarksburgh, R. T. Lowndes.
Hartmonsville, W. C. Tabb.
Middlebrook, S. F. H. Hewit.
*Parkersburgh, T. G. Field.
*Rockport, R. D. J. Echols.
Tyler Creek, F. M. Swann.
*White Sulpher Springs, T. Surber.

WISCONSIN.

Cadiz, B. C. Curtis.
Delavan, George L. Collie.
Embarrass, J. E. Breed.
Fond du Lac, J. C. Wedge.
Fredonia, B. H. Meyer.
Glasgow, Henry M. Crombie.
Lincoln, A. J. Loose.
Madison, Washburn Observatory.
Manitowoc, Miss Clasina Lüps.
Oshkosh, Prof. W. N. Mumper.

Place of observation and observer.

WISCONSIN—*Continued.*

Waucousta, G. H. Yapp.
Weston, R. R. Wilkinson.

FOREIGN.

Burnside, S. A., Dr. C. J. Hering.
Grand Turk, W. Indies, Geo. I. Gibbs.
Guanajuato, Mexico, Met'l Obs'y.
Hamilton, Bermuda, General Russell Hastings.
Killisnoo, Alaska, Jos. Zuboff.
Leon, Mexico, Prof. M. Leal.
Mazatlan, Mexico, Leon P. Acosta.
Mexico, Mexico, Meteorological Obs'y.
Monterey, Mexico, Dr. Wm. De Ryee.
Montreal, Quebec, C. H. McLeod.
New Westminster, B.C., Capt. A. Peele.
Port au Prince, Hayti, Prof. I. Scherer.
*Pueblo, Mexico, Catholic Institute.
Zacatecas, Mexico, Jose A. y Borrilla.

New observers, February, 1889.

*Butler, Ala., B. F. Gilder.
*Greensborough, Ala., M. H. Yerby.
Elkmont, Ala., D. J. Moore.
*San Bernardino, Cal., A. K. Holt.
Denver, Colo., Rev. Wm. Fowtail, S. J.
De Smet, Dak., T. H. Ruth.
Diamond, Ga., Wm. Kimzey.
Webster, Iowa, C. M. Trumbauer.
*Bonnieville, Ky., W. K. Jameson.
Willow Springs, Mo., J. A. Key.
Kennedy, Neb., Mrs. M. G. Erickson.
Embudo, N. M., Geo. E. Curtis.
Lyons, N. Y., Dr. M. A. Veeder.
Mt. Pleasant, N. C., H. L. T. Ludwig.
Southern Pines, N.C., Prof. E. A. Martin.
Wake Forest, N.C., Prof. E. G. Beckwith.
*Washington, N. C., J. M. Gallagher.
Morganton, N. C., P. P. Lorbacher
Kent, Ohio, P. W. Eigner. [Shelly.
Aqueduct Tower, (Lagonia) Pa., D. M.
Tuscarora, Pa., R. J. Micky.
Petersburgh, Pa., J. E. Rooney.
*Brewer Mine, S. C., L. Woeltze.
Austin, Tex., Q. C. Smith, M. D.
La Logia, Mexico, H. Patrick.
*Topolobampo, Mex., Lilian Whitehill.

New stations in March.

Lochiel, Ariz., R. Ford.
Mount Hamilton, Cal., Lick Obs'y.
Grand Lake, Colo., Jas. Cairns.
Archer, Fla., A. F. Wyman.
Lake City, Fla., Dr. J. C. Neal.
Leavenworth, Kans., F. J. Waltz.
Rome, Kans., D. M. Adams.
McHenry, Ky., M. G. Duncan.
Shell Beach, La., E. Dechampas.
Plum Creek, Nebr., G. F. Cain.
Stratton, Nebr., J. B. Slime.
Tannersville, N. Y., H. M. Wilson.
Rock Spring, N. C., T. J. Cates.
Soapstone Mount, N. C., H. L. Kimrey.
Poland, Ohio, Chas. Stratton.
Vienna, Ohio, M. D. McCorkle.
Grant's Pass, Oregon, Dr. J. G. Jessup.
Tipton, Pa., Miss C. J. Wilson.
Howe, Tex., W. M. Smith.
Pecos City, Tex., C. H. Merriman.
Bolar, Va., Geo. F. Eakle.
Hayward, Wis., J. M. Custard.
Neillsville, Wis., Wm. Heaslett.
Richland Centre, Wis., H. M. Ludwig.
Summit Lake, Wis., E. S. Koepenick.
Viroqua, Wis., F. J. Bold.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for March, 1889.

Alabama.
Mount Vernon B'ks.

Arizona.
Apache, Fort.
Bowie, Fort.
Huachuca, Fort.
Lowell, Fort.
McDowell, Fort.
Mojave, Fort.
San Carlos.
Verde, Fort.
Whipple Barracks.

Arkansas.
Hot Springs.
Little Rock, Barracks.

California.
Alcatraz Island.
Angel Island.
Benecia Barracks.
Bidwell, Fort.
Gaston, Fort.
Mason, Fort.
Presidio of San F.

California—Cont'd.
San Diego Barracks.

Colorado.
Crawford, Fort.
Lewis, Fort.
Logan, Fort.
Lyons, Fort.

Connecticut.
Trumbull, Fort.

Dakota.
A. Lincoln, Fort.
Bennett, Fort.
Buford, Fort.
Meade, Fort.
Pembina, Fort.
Randall, Fort.
Sisseton, Fort.
Sully, Fort.
Totten, Fort.
Yates, Fort.

Florida.
Barrancas, Fort
Saint Francis B'ks.

Idaho.
Boisé Barracks.
Sherman, Fort.

Illinois.
Rock Island Arsenal.
Sheridan, Fort.

Indian Territory.
Gibson, Fort.
Reno, Fort.
Sill, Fort.
Supply, Fort.

Kansas.
Hays, Fort.
Leavenworth, Fort.
Leavenworth Prison.
Riley, Fort.

Kentucky.
Newport Barracks.

Louisiana.
Jackson Barracks.

Maine.
*Kennebec Arsenal.
*Preble, Fort.

Maryland.
McHenry, Fort.

Massachusetts.
Springfield Armory.
Warren, Fort.

Michigan.
Brady, Fort.
Mackinac, Fort.
Wayne, Fort.

Minnesota.
Snelling, Fort.

Missouri.
Jefferson Barracks

Montana.
Assinaboine, Fort.
Custer, Fort.
Keogh, Fort.
Maginnis, Fort.
Missoula, Fort.
Poplar River, Fort.
Shaw, Fort.

Nebraska.
Niobrara, Fort.

Nebraska—Cont'd.
Omaha, Fort
Robinson, Fort.
Sidney, Fort.

Nevada.
McDermitt, Fort.

New Mexico.
Bayard, Fort.
Seldon, Fort.
Stanton, Fort
Union, Fort.
Wingate, Fort.

New York.
Columbus, Fort.
David's Island.
Hamilton, Fort.
Madison Barracks.
Niagara, Fort.
Plattsburgh Barracks.
Porter, Fort.
Schuyler, Fort.
Wadsworth, Fort.
Watervliet Arsenal

New York—Cont'd.
West Point M. A.
Willett's Point.

Ohio.
Columbus Barracks.

Oregon.
Klamath, Fort.

Pennsylvania.
Allegheny Arsenal.
Frankfort Arsenal.

Rhode Island.
Adams, Fort.

Texas.
Bliss, Fort.
Brown, Fort.
Clark, Fort.
Concho, Fort.
Davis, Fort.
Eagle Pass, Camp.
Elliott, Fort.
Hancock, Fort.
McIntosh, Fort.
Pena Colorado, Camp.

Texas—Cont'd.
Ringgold, Fort.
San Antonio, Post at

Utah.
Du Chesne, Fort.
Douglas, Fort.

Virginia.
Monroe, Fort.
Myer, Fort.

Washington Ter.
Spokane, Fort.
Townsend, Fort.
Vancouver, Fort.
Walla Walla, Fort.

Wyoming.
Bridger, Fort.
D. A. Russell, Fort.
Laramie, Fort.
McKinney, Fort.
Pilot Butte, Camp.
Sheridan, Camp.
Washakie, Fort.